

GECO: USER MANUAL

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Acronyms:

| | |
|-----|---|
| ARB | A nomaly R eview B oard |
| CD | C onceptual D esign |
| CRB | C onfiguration change R eview B oard |
| DD | D etailed D esign |
| NRB | N on-conformity R eview B oard |
| PD | P reliminary D esign |
| PRD | P Ro D uction P hase |
| PT | P roduct T ree |
| XML | e Xtensible M arkup L anguage |



Change Control

| Issue | Date | Section | Page | Change Description |
|-------|----------|---|--|--|
| 1.A | 15/02/08 | All | All | First issue |
| 1.B | 14/06/11 | 3.4 14.5 | 23 138 | Second issue: - GECO configuration file section added. - Delete users. |
| 1.C | 27/06/12 | 3.3.2 3.4 16 | 20 23 141 | Third issue: - New fields in the user installation wizard. - A clarification note add (Note 1) - The documents codification conventions is clarified. |
| 1.D | 09/11/13 | 3.1 5.6 6.2 6.6 7.2 7.6 8.2 9.3 9.6 | 15 39 41 47 49 56 58 73 77 | Forth issue: - Supported Java 1.7 - Added new functionality “Export PT elements to XLS” - Change the length of comment field in Part form - Added new functionality “Export Parts to XLS” - Change the length of description field in Interface form. - Added new functionality “Export Interfaces to XLS” - Added the possibility of change the requirement code. - Added new fields to verification matrix form. - Added new functionality “Verification Matrix Summary View” |
| 1.E | 25/07/14 | 8.7 9.2 9.6 9.7 | 69 72 77 78 | Fifth issue: - Add new functionality to export the requirement’s children search to xls. - Add the possibility to insert the requirements in the verification matrix by searching by requirement document. - Add the possibility to search by requirement document in the verification matrix summary view. - Add the possibility to search by requirement document in the export verification matrix to xls. |



Reference Documents

| N# | Document Name | Code |
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1. SUMMARY

This is the User Manual of the Fractal GEneral COnfiguration Management Tool (GECO).

In this manual, you could learn:

- GECO functionality,
- How to use the application step by step and
- How to handle the problems that could arise.

2. GECO OVERVIEW

The goal of GECO is twofold: firstly, to assist the System Engineering Group to control and maintain the configuration items of a system, both in the development phase and in the operation and maintenance phase; secondly, to make this information available to the other groups within the organisation or the consortium in charge of developing and operating the System.

Developing a proper System Engineering Plan is a distinct advantage for leading a project to success. During the implementation of such plan, the system configuration data are generated: Product Tree (PT) elements, requirements, interfaces, specification documents, procedures, reports, etc. The amount of information keeps growing in size and complexity along the project's lifetime, to an extent that it becomes virtually impossible to manage such information without the aid of specific computer-based tools.

Specifically, the system information that can be stored and controlled through this tool is:

- The Product Tree elements and the parts
- The table of interfaces.
- The requirements, interface requirements and the relationships between parent and child requirements.
- The requirement verification matrix
- The configuration changes
- Non-conformities
- Verification and operation anomalies
- The project documentation, i.e. specification documents (at the system and subsystem level); interface specification documents; tests, analysis and assessment documents; etc.

2.1 GECO Functionality: A quick look

The configuration information is hierarchically distributed following the Product Tree of the system. This provides an intuitive view of the system's breakdown structure, and thus allows the user to access, with a few mouse clicks, to a Product Tree element, its requirements, interfaces, associated documents, etc.



Each Product Tree element shall have a code that identifies it uniquely. Using a consistent, manageable coding convention is a paramount, as this code shall be the base for assigning codes to the rest of the configuration items: documents, requirements, interfaces, etc. The user defines the PT element code, and then the Configuration Management Tool shall generate automatically the codes of the remaining configuration items; the user can either accept or modify such codes, but the tool shall check that the codes are not duplicated or they are inconsistent.

The General Configuration Management Tool provides the following functionalities, which we describe as displayed in the tool corresponding to the different folders on the top bar (underscored and bolt letter is used to press on the keyboard to execute the command):

- ❖ **File** utilities: the commands included here are:
 - **P**rint view, for printing the selected view
 - **E**xit for closing the tool
- ❖ **Views**: the Data Views screens (see section 4.2) allow the user to visualise as a table all the relevant information stored for a PT element. Once a PT element is selected on the screen, the following views are available:
 - **A**nomalies View
 - **C**onfiguration changes View
 - **D**ocumentation View
 - **P**T **e**lements View
 - **I**nterfaces View
 - **N**on-conformities View
 - **P**arts View
 - **R**equirements View
 - **V**erification matrix View
- ❖ **Forms**: the Data input forms screens provide forms for adding or modifying the data associated to each configuration item. Once a PT element is selected, any of the forms described below can be opened. The form provides access to all the records associated to the element, and allows the user to search or filter information based on the fields contained in the specific form.
 - **A**nomalies Form (see section 13): this form allows the user to start new anomalies or to add information to the already existing ones. Similarly to the configuration changes and non-conformities, the tool shall send notifications to the users in charge of the anomaly.
 - **C**onfiguration changes Form (see section 11): it allows the user to start new configuration changes and to add information to the changes that already are in course (conducted actions, changes of status, affected documents, etc). The process associated to the configuration changes may range from very simple (when the change considered does not affect other elements of the system) to rather complex (when other elements or different working groups are involved). In any case, the application helps to coordinate this process by sending the necessary notifications to the users affected by the change, as the configuration



change goes through its lifecycle (approved, rejected or finalized), i.e. it guides the user through the lifecycle defined for a configuration change.

- **D**ocumentation Form (see section 9.6): this form allows the user to enter or to modify the documents associated to the project by connecting them with PT elements. They may be requirement specification documents, analyses, reports, procedures, etc. It is essential that the Configuration Management Tool contains the project documents, or at least it can link them from another database, as the requirements are usually traced to documents (analysis documents, reports, etc) that contain the rationale for the requirement, and therefore they help to understand the consequences of a configuration change.
- **P**T elements Form (see section 5): where the definition of the elements of the PT can be introduced and be modified, for example the related documents, etc.
- **I**nterfaces Form (see section 6.6): this form allows the user to define and to modify the interfaces among the PT elements, thus showing which elements are related to each other.
- **N**on-conformities Form (see section 12): this form allows the user to start a new Non-conformity, as well as to add new bits of information to the already existing non-conformities. Similarly to the configuration changes, the tool sends notifications to the users affected by the Non-conformity as it goes through its lifecycle (approved, rejected or fixed), i.e. it guides the user through the lifecycle defined for a Non-conformity.
- **P**arts Form (see section 6): where the definition of the Parts can be introduced and modified (for example the related documents, etc.)
- **R**equirements Form (see section 7.6): this form allows the user to enter new requirements, or to modify the already existing requirements, associated to a certain PT element. A major functionality of this form is the ability to track down this requirement to other requirements or to documents, what is crucial for identifying what a configuration change or a non-conformity actually involves. This utility is used for assessing the impact of the proposed change in terms of scope, schedule and price, and it is one of the major goals of the Configuration Management Tool.
- **U**sers Form (see section 14): this form allows the administrator to enter or to modify the users authorized in the system.
- **V**erification matrix Form (see section 9): this form allows the user to enter and to modify the results of the verification tests.

❖ **Tools:** the Configuration Management Tool provides a set of built-in utilities that are described below:

- Consult requirement's children (see section 8.7): the tool shall display the requirements that are affected by a change in a higher level requirement. To do so, the parent-child (traceability) relationships that were introduced in the Requirements Form are considered.
- Consult requirement's parents (see section 8.6): the tool shall display the requirements that are affected by a change in a lower level requirement.



- Export requirements to XML (see section 10.6): Automatic generation of the requirements document: the tool gathers the requirements of the selected PT element and then generates the document section where the requirements are specified; such section can be imported into the definitive formal specification document, as it is described in the corresponding chapter. The format of the generated document section is XML.
- Export interfaces to XLS (see section 7.6): all the interfaces of one subsystem and lower level elements will be exported to an XLS document.
- Export PT elements to XLS (see section 5.6): all the PT elements of one subsystem and lower level elements will be exported to an XLS document.
- Insert requirements into the Verification matrix automatically (see section 9.2): all the technical requirement of one subsystem can be automatically introduced in the verification matrix when the user decides that such subsystem is ready for being verified.
- Verification Matrix summary view (see section 9.6): a summary view of the verification matrix elements of one subsystem and below will be exported to a pdf document.
- Export Verification Matrix to XLS (see section 9.7): all the verification matrix elements of one subsystem and lower level elements will be exported to an XLS document.
- Filter table ... (see section 4.2.3): this allows the user to search or filter information based on the fields contained in the specific form or view.

The General Configuration Management Tool contains a database and a user-friendly graphical interface. The application uses a popular database, whereas the user interface is developed in Java, what makes it platform independent, i.e. it runs on Unix, Linux and MS-Windows operating systems.

❖ **Help**: to give support while using GECO.

- About contains this manual in PDF format



3. INSTALLING GECO

3.1 Software requirements

The minimum software requirements to install GECO on your computer are the following:

- Windows XP/Vista or Linux 2.4 or greater
- The Java Runtime Environment 1.7 or greater
- MySql Server v5.0 or greater (only needed in the server installation)

(For more information to download and install Java Runtime Environment and MySQL Server see the page <http://www.fractal-es.com/en/GECO.html>)

3.2 MySQL Server configuration

After MySQL Server is installed (only needed in the server installation), there are a couple of parameters to be modified at my.ini MySQL options file in order to have working properly GECO database.

The options to add or modify are described in the following lines:

- *Character set and collation.*

Add the following lines in the options file:

```
[mysql]
default-character-set=utf8

[mysqld]
default-character-set=utf8
default-collation=utf8_general_ci
```

- *max_allowed_packet*

Add the following lines in the options file:

```
[mysqld]
max_allowed_packet=100M
```

Note: When a MySQL client or the **mysqld** server receives a packet bigger than `max_allowed_packet` bytes, it issues a Packet too large error and closes the connection. If it happens, the `max_allowed_packet` value can be increased from 100 MB to as much as 1GB.

3.3 GECO Installation

The installation wizard permits the user to perform the following two different installations:

- GECO Server installation to install GECO application and the database using the MySQL server running in this machine as described in section 3.3.1.
- GECO User installation to install only GECO application as described in section 3.3.2.

3.3.1 Server Installation

Once the installation wizard is executed:

1. The following licence dialog will appear

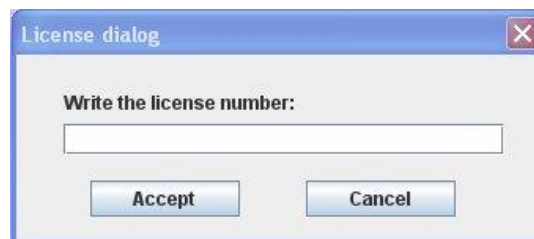


Figure 1: GECO Licence dialog

⇒ Introduce the *licence number*,

⇒ click *Accept*,

If the licence number is not correct, the installation will be cancelled and the following dialog appears:

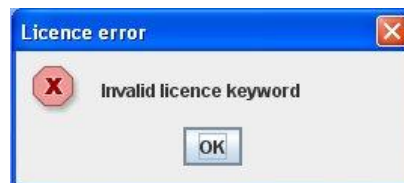


Figure 2: GECO licence Error dialog

2. Once the licence number is accepted, the following working dir dialog will be opened.

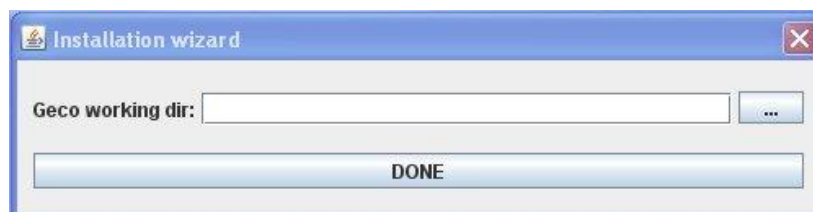


Figure 3: GECO Working dir dialog

⇒ Introduce the *working dir* or select it from an Open dialog by clicking the ... button,

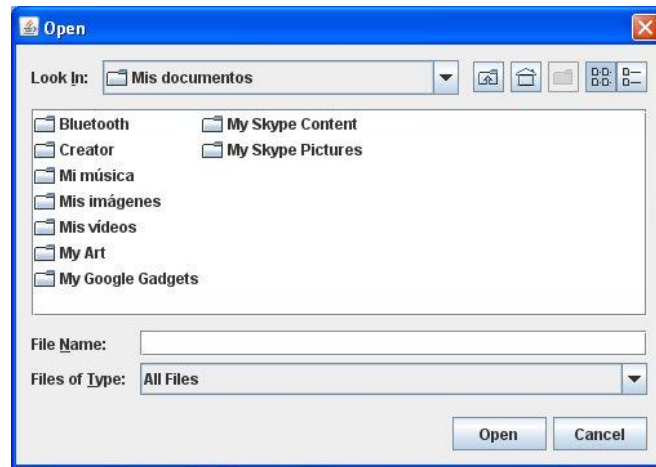


Figure 4: *Open dir dialog*

⇒ click *Accept*

3. The wizard will open the following GECO configuration wizard dialog.



Figure 5: *GECO configuration wizard dialog*

⇒ Select *GECO Server* option,

⇒ Click *Continue*.

4. The wizard will open GECO configuration wizard: Step 1 dialog, where the information about the MySQL server as well as GECO server name (networking name or IP) must be introduced.

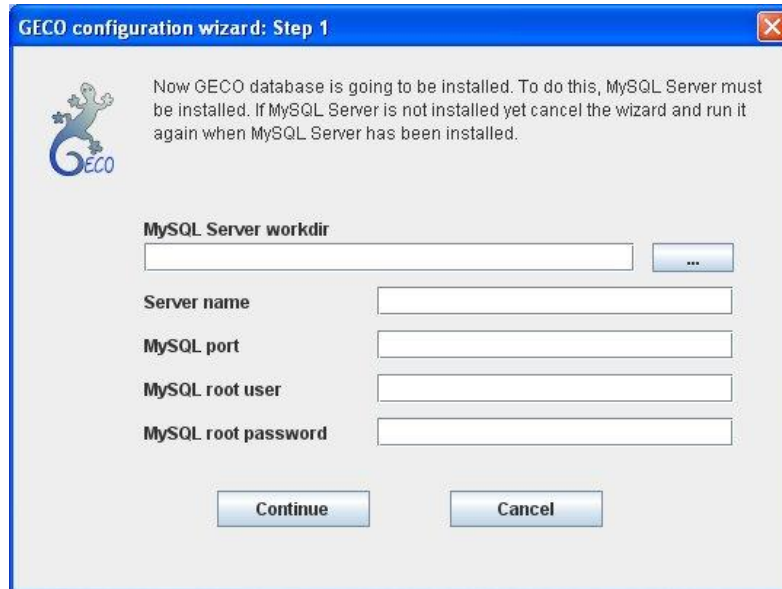


Figure 6: GECO configuration wizard Step 1 dialog

- ⇒ Introduce the *MySQL Server workdir* (path to the MySQL binary files) or select it from an Open dialog by clicking the ... button,
- ⇒ Introduce the *Server name*,
- ⇒ Introduce the *MySQL port*,
- ⇒ Introduce the *MySQL root user*,
- ⇒ Introduce the *MySQL root password*,
- ⇒ Click *Continue*.

The wizard will install GECO Database and will also create the users needed by GECO application in the MySQL server.

If the information is not right or there are any problem with the MySQL Server, the installation will be cancelled and the following dialog will appear:

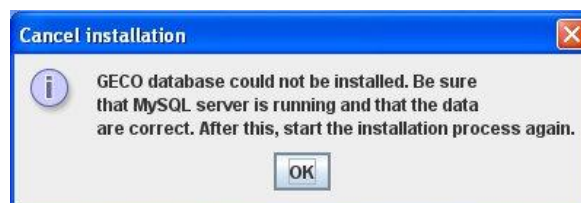


Figure 7: Cancel installation dialog

5. The wizard will open GECO configuration wizard Step 2 dialog, where the information that GECO application needs to send e-mails to GECO users must be introduced.

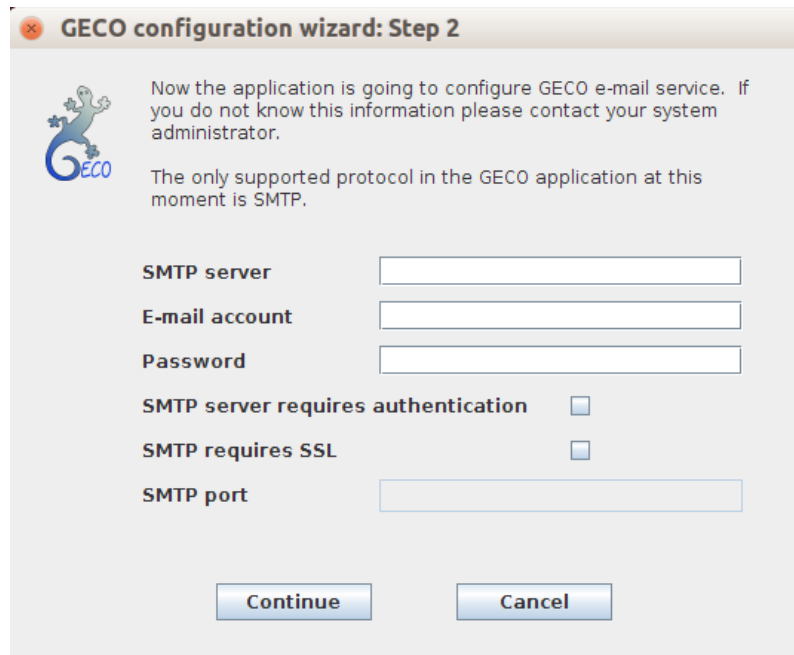


Figure 8: GECO configuration wizard Step 2 dialog

- ⇒ Introduce the SMTP *server name*,
 - ⇒ Introduce the *e-mail account* (account created to send GECO e-mails, for example name@company.com),
 - ⇒ Introduce the e-mail account *password*,
 - ⇒ If the SMTP server needs authentication, select the checkbox *Authentication required by the server*,
 - ⇒ If the SMTP server requires SSL, select the checkbox *SMTP server requires authentication*,
 - ⇒ If the SMTP server requires SSL, introduce the SMTP port,
 - ⇒ Click *Continue*.
6. The wizard will finish GECO installation and will start GECO application.

3.3.2 User Installation

Once the installation wizard is executed:

1. The following licence dialog will appear

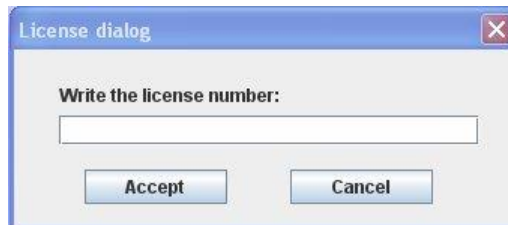


Figure 9: GECO Licence dialog

- ⇒ Introduce the *licence number*,
- ⇒ click *Accept*,

If the licence number is not correct, the installation will be cancelled and the following dialog appears:

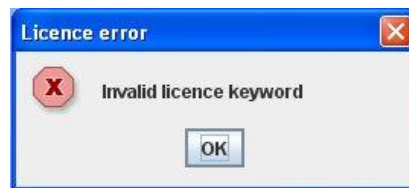


Figure 10: GECO licence Error dialog

2. Once the licence number is accepted, the following working dir dialog will be opened

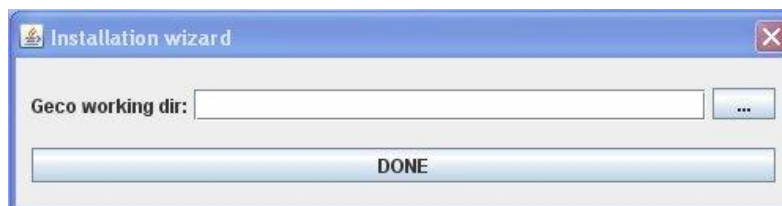


Figure 11: GECO Working dir dialog

- ⇒ Introduce GECO *working dir* or select it from an Open dialog by clicking the ... button,

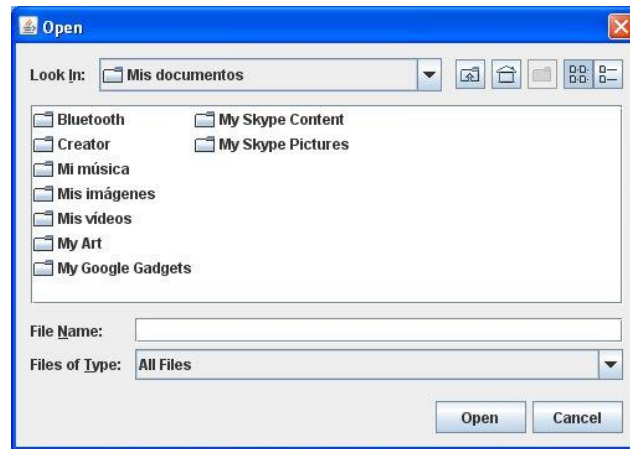


Figure 12: *Open dir dialog*

- ⇒ click *Accept*

3. The wizard will open the following GECO configuration wizard dialog.



Figure 13: *GECO configuration wizard dialog*

- ⇒ Select the *User* option,

- ⇒ Click *Continue*.

4. The wizard will open GECO configuration wizard: Step 1 dialog, where the information about GECO server name (networking name or IP) and MySQL port must be introduced.



Figure 14: GECO configuration wizard Step 1 dialog

- ⇒ Introduce GECO *server name*,
- ⇒ Introduce the *MySQL port*,
- ⇒ Introduce the *MySQL database name*,
- ⇒ Introduce the *MySQL database write username*,
- ⇒ Introduce the *MySQL database write user password*
- ⇒ Introduce the *MySQL database read username*,
- ⇒ Introduce the *MySQL database read user password*,
- ⇒ Click *Continue*.

The wizard will configure GECO application according to the introduced data.

5. The wizard will open the following GECO configuration wizard: Step 2 dialog, where the information that the application needs to send e-mails to GECO users must be introduced.



Figure 15: GECO configuration wizard Step 2 dialog

- ⇒ Introduce the SMTP *server name*,
- ⇒ Introduce the *e-mail account* (account created to send GECO e-mails, for example name@company.com),
- ⇒ Introduce the e-mail account *password*,
- ⇒ If the SMTP server needs authentication, select the checkbox *Authentication required by the server*,
- ⇒ If the SMTP server requires SSL, select the checkbox *SMTP requires SSL*,
- ⇒ If the SMTP server requires SSL, introduce the SMTP port,
- ⇒ Click *Continue*.

6. The wizard will finish GECO installation and will start GECO application.

3.4 GECO configuration file

The file geco.props is the GECO configuration file.

The parameter to configure are (the file path is `$GECO_WOKRDIR/geco.props`):

- *mySQLPort* -> MySQL port (for example 3306).

mySQLPort=3306

- *mySQLHost* -> MySQL host name (for example localhost).



mySQLHost=localhost

- *dbName* -> MySQL database name (by default geco).

dbName=geco

- *userAdmin* -> It's the database MySQL user with the needs rights to can read/write the database.

userAdmin=USERADMIN

- *userRead* -> It's the database MySQL user with only read rights in the database.

userRead=USERREAD

- *passwordAdmin* -> It's the database MySQL userAdmin password.

passwordAdmin=USERADMINPASSWORD

- *passwordRead* -> -> It's the database MySQL userRead password.

passwordRead=USERREADPASSWORD

- *keyword* -> -> It's the keyword licence.

keyword=KEYWORD

- *mail.smtp.host* -> Mail SMTP Host name of the company (for example mail.fractal-es.com).

mail.smtp.host=mail.fractal-es.com

- *mail.smtp.auth* -> TRUE if the SMTP Mail Server need authentication, FALSE if not.

mail.smtp.auth=TRUE

- *mail.smtp.user* -> e-mail user to manage the GECO e-mail service (for example docma@company.com).

mail.smtp.user=docma@company.com

- *mail.smtp.password* -> e-mail user password to manage the GECO e-mail service.

mail.smtp.password=password

- *mail.from* -> e-mail user to manage the GECO e-mail service (for example docma@company.com).

mail.from=docma@company.com



In the case the mail SMTP server is secure (SSL), you have this others parameters:

- *mail.smtp.port* -> Mail SMTP port (for example 465).

```
mail.smtp.port=465
```

- *mail.smtp.socketFactory.port* -> Mail SMTP socketFactory port (for example 465). It is the same that in the parameter *mail.smtp.port*.

```
mail.smtp.socketFactory.port=465
```

- *mail.smtp.socketFactory.class* -> Mail SMTP socketFactory class. The value for this parameter has to be **javax.net.ssl.SSLSocketFactory**.

```
mail.smtp.socketFactory.class=javax.net.ssl.SSLSocketFactory
```

Note: If you change the user and/or password of the generic userAdmin and userRead users in the MySQL server, you have to change the username and/or the password values in the `geco.props` parameter *userAdmin/userRead* and/or *passwordAdmin/paswordAdmin*.

Note 1: If you change the database name in the MySQL server, you have to change the *dbName* value in the `geco.props` parameter *dbName*.

4. STARTING GECO

4.1 Logging into GECO

Once GECO is executed, the following Login window will appear:

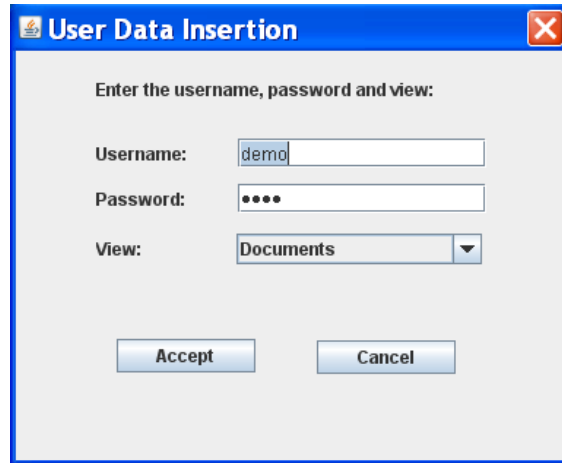
A screenshot of a Windows-style dialog box titled "User Data Insertion". The dialog has a blue title bar with a close button (X) in the top right corner. The main area is light gray and contains the text "Enter the username, password and view:". Below this text are three input fields: "Username:" with the text "demo" entered, "Password:" with four dots (••••) entered, and "View:" with a dropdown menu showing "Documents". At the bottom of the dialog are two buttons: "Accept" and "Cancel".

Figure 16: GECO. Login window

- ⇒ Introduce the *Username*,
- ⇒ Introduce the *Password*,
- ⇒ Select in the *View combo box* which view is going to be displayed whenever the logging in is successful (by default, the *Documents View* is selected).
- ⇒ click *Accept*,

If the login information is correct, the Main window will be opened.

| Project configuration: Documentation View | | | | | | | | | | |
|---|------------------------|---|-------|---------|---------|--------------|---------|------------|-------------|--|
| File Views Forms Tools Help | | | | | | | | | | |
| PT | Code | Title | Issue | Edition | Status | Reference... | Conf... | Date | Sub-subject | |
| EF | ANA/EF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics | |
| IC | PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics | |
| | PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics | |
| | RPT/EF/001 | Verification Test Report in the Plate Scale ... | 1 | A | Created | | false | 21-03-2006 | Optics | |
| | RPT/EF/002 | Verification Test on the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System | |
| | RQ/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures | |
| | RQ/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure-... | 1 | A | Created | | true | 21-03-2006 | System | |
| | RQ/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics | |
| | SP/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter | |
| | SP/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System | |

Figure 17: Documentation View (Default view) and main menu

The User could either modify the data and enter new data or only read the current one according to the rights assigned to him/her.

4.2 Accessing the data

As it was described in the overview of the application (section 2), all the data are hierarchically distributed following the Product Tree of the systems. It allows the user to find quickly all the information exiting in GECO associated with a particular Product Tree Element.

4.2.1 Changing Views

In the Main window application, the different views can be changed by selecting *Views Menu* \Rightarrow *xxxx View* or pressing *ALT+V+x*.

Where, *xxxx* can be any of the following:

- Anomalies (*x: A*)
- Configuration changes (*x: C*)
- Documentation (*x: D*)
- Product Tree elements (*x: E*)
- Interfaces (*x: I*)
- No-conformities (*x: N*)

- Parts ($x: P$)
- Requirements ($x: R$)
- Verification Matrix ($x: V$)

Whenever the view is changed, the Product Tree element selection comes back to the highest-level element of the tree.

Therefore, all records existing in GECO corresponding with the selected view will be displayed in the left part of the application.

4.2.2 Moving through the PT elements

In the Main window application, select a Product Tree element by clicking the desired element with the left button of the mouse.

The selected Product Tree element will be highlighted.

All records corresponding to the view previously selected and belonging to this Product Tree element (and, also, to the low-level Product Tree elements under the selected one) will be displayed in the left part of the application.

Those elements with lower level subsystems in the PT appear with a symbol (like a key). The horizontal / closed position indicates that the low level subsystems exist but they are not currently shown while the vertical / open position indicates that the subsystems are being shown.

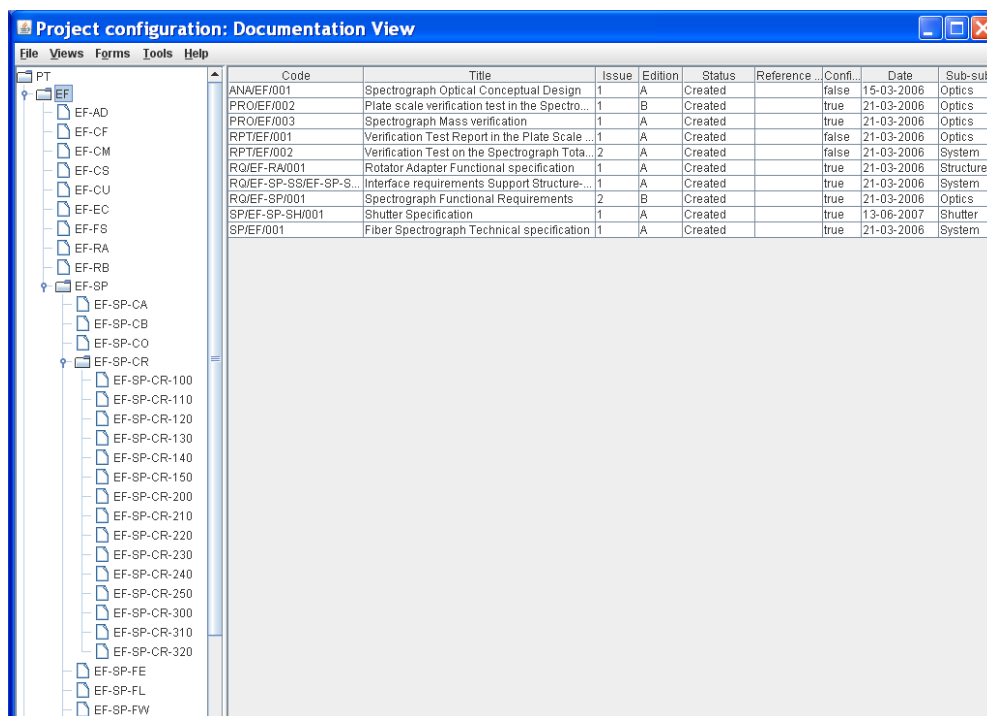


Figure 18: Selected PT element (left) and its corresponding view shown at the right

4.2.3 Filtering the data

The number of records to be displayed can be constrained by using the filtering option.

In order to filter the records, in the Main window of the application, select *Tools Menu* \Rightarrow *Filter table ...* or press *ALT+T+F*.

A new window will appear,

- \Rightarrow Select in the *Field combo box* the desired field to filter the data. All the fields of the corresponding view will be displayed in the combo box.
- \Rightarrow Write in the *Value* text field the text that is going to be used to filter the previously selected field step, (upper and lower cases are not distinguished).
- \Rightarrow Define as many filters as wanted (by adding new lines),
- \Rightarrow Click *Accept*,



Figure 19: *Filter Dialog. Any field can be selected for any value*

In the Main window, the records displayed will have been filtered according to the criteria selected in the filter window.

4.2.4 Printing the data

The current view (i.e., the records that are currently displayed) can be printed using the printing option.

In order to print the records, in the Main window of the application, select *File Menu* \Rightarrow *Print view* or press *ALT+F+P*. The application will look for the printers connected to your computer and the print menu will be opened.

A new window will appear,

- \Rightarrow select in the *Name combo box* the printer to be used,
- \Rightarrow define the desired properties for this job,
- \Rightarrow click *Accept*,

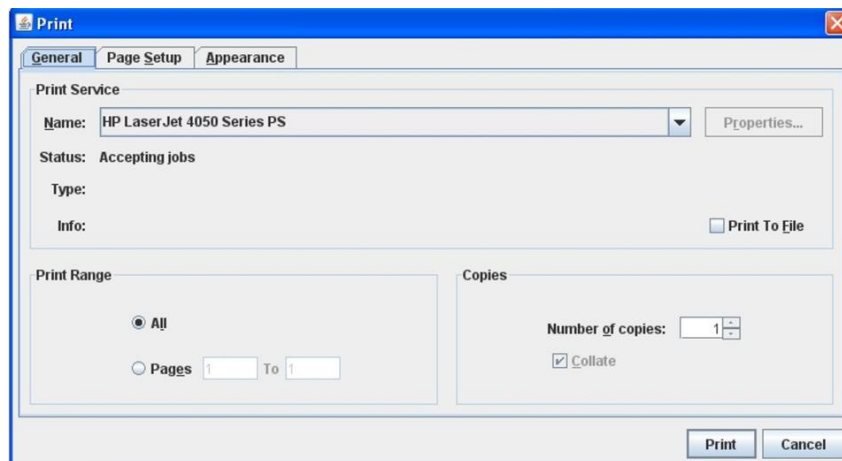


Figure 20: Print Dialog. The selected fields at the right panel of the tool will be printed

4.2.5 Editing the data

In order to edit the data, the corresponding Form View of the record to be modified must be opened (see sections from 5 to 14 for a detailed explanation).

Whenever editing the data in the Forms, you have to take into account that:

The mouse cannot be used to copy or paste the fields, but to select part of the text inside a field. Then you can use the DEL key to delete the selected text. Also, you can use the key CTRL+C to copy a field and CTRL-V to paste a field.

4.3 Exit from GECO

In the Main window, select *File* Menu \Rightarrow *Exit* or press ALT+F+E.

The application will end.

5. PRODUCT TREE ELEMENTS

5.1 What is a Product Tree?

The product tree (PT, Product Tree) describes the hierarchic breaking up of a complex system in the necessary levels to be able to define the system completely. An example of a Product Tree is shown in the following figure:

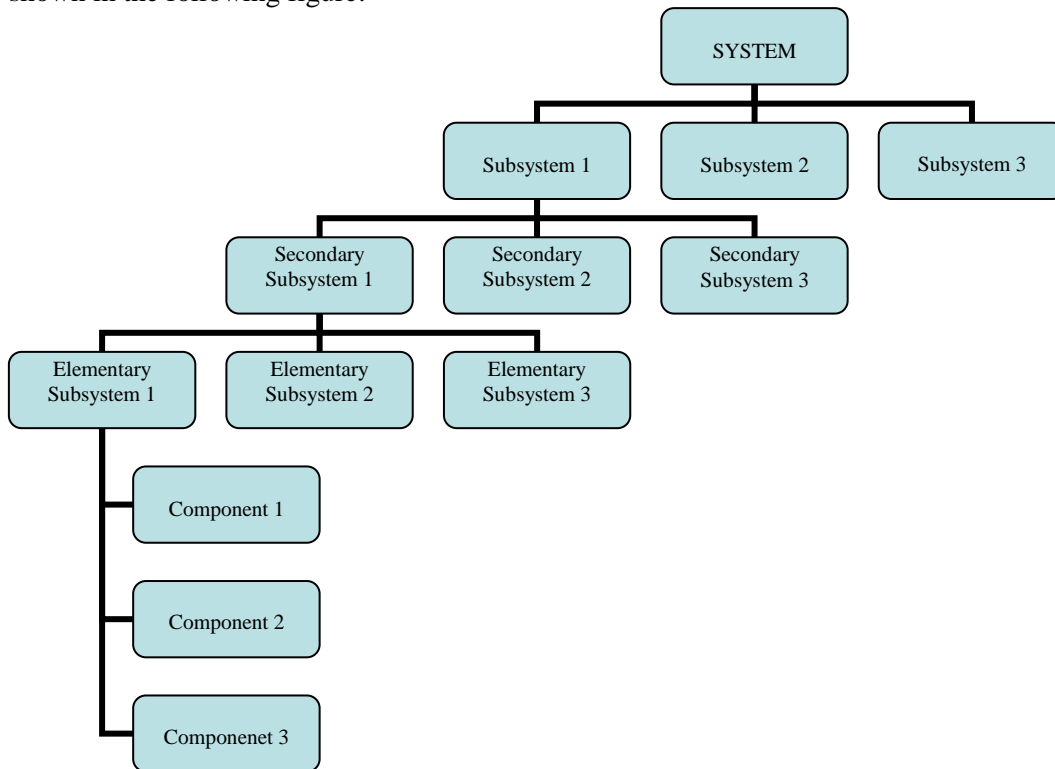


Figure 21: Product Tree: a hierarchical organization of subsystems

From the project point of view, the Product Tree provides a representation of the whole system and breaks the system up into the subsystem levels that are going to be designed and procured independently.

Each Product Tree element (i.e., system, subsystems or components) must be uniquely identified by a Product Tree element code. These codes can be used as a base to uniquely identify other elements of the project such as interfaces, requirements, documents, etc.

5.2 Creating a new Product Tree Element

Starting at the Main Window of the application,

Project configuration: Documentation View

File Views Forms Tools Help

| Code | Title | Issue | Edition | Status | Reference | Conf. | Date | Sub-subject |
|------------------------|---|-------|---------|---------|-----------|-------|------------|-------------|
| ANAEF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics |
| PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics |
| PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics |
| RPT/EF/001 | Verification Test Report in the Plate Scale | 1 | A | Created | | false | 21-03-2006 | Optics |
| RPT/EF/002 | Verification Test on the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System |
| RQ/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures |
| RQ/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure... | 1 | A | Created | | true | 21-03-2006 | System |
| RQ/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics |
| SP/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter |
| SP/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System |

Figure 22: Main window of the application

The following steps must be executed in order to create a new Product Tree element:

A. Open the Configuration Elements Form.

In the Main window, the Product Tree elements Form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms Menu* ⇒ *PT elements Form* or press *ALT+O+E*.

The PT Elements Form will be opened with all available records selected.

PT Element Form

Code* EF Name* Fiber Spectrograph

Sub-subject* System Date 20-03-2006 Status* CD

Description

This instrument is composed by an optical fibers robot (which is rotating with the telescope). This robot feed a static spectrograph (non-rotating) placed on the Nasmyth platform.

Document related to the CE

| # | Document |
|----|------------|
| 1 | ANAEF/001 |
| 2 | PRO/EF/002 |
| 3 | RPT/EF/001 |
| 4 | SP/EF/001 |
| 5 | SP/EF/001 |
| >> | |

1 from 43

Figure 23: PT Elements Form (with all records selected)

A.II. Selecting a Product Tree element in the Product Tree elements View.

In the Main window, click the *Views Menu* ⇒ *PT elements View* or press *ALT+V+E*.

Project configuration: PT elements View

File Views Forms Tools Help

| Code | Name | Sub-subject | Status CE | Description |
|--------------|-----------------------------------|-------------|-----------|---|
| EF | Fiber Spectrograph | System | CD | This instrument is composed by an optical fibers... |
| EF-AD | Atmospheric Dispersion Corre... | Optics | CD | Optical system that allows to compensate the at... |
| EF-CF | Field Curvature Corrector | Optics | CD | Optical system that corrects the telescope focal p... |
| EF-CM | Calibration Module | Optics | CD | System with different types of lamps (arc lamps, ... |
| EF-CS | Control System | Control | CD | Instrument Control System including hardware a... |
| EF-CU | High level User Software Contr... | Control | CD | This subsystem includes the high level user-orie... |
| EF-EC | Electronic Cabinets | Control | CD | Cabinets containing the mechanisms drives cont... |
| EF-FS | Optical fibers | Optics | CD | Optical fibers, micro-lenses and associated sup... |
| EF-RA | Telescope Rotator Adapter | Mechanics | CD | This is the mechanical interface between the rob... |
| EF-RB | Focal Plane Robot | Optics | CD | Robot that can position several mechanical artic... |
| EF-SP | Spectrograph | Optics | CD | The instrument produces the spectra of the light ... |
| EF-SP-CA | Camera | Optics | PD | Camera of the spectrograph to focus the light co... |
| EF-SP-CB | Cabling | Optics | PD | Cabling |
| EF-SP-CC | Collimator | Optics | PD | Collimator that produces a collimated beam wher... |
| EF-SP-CR | Cryostat | Cryogenics | PD | |
| EF-SP-CR-100 | CCD Head | Cryogenics | PD | CCD Head |
| EF-SP-CR-110 | CCD Head external body | Cryogenics | PD | CCD head external body |
| EF-SP-CR-120 | Detector Mount | Cryogenics | PD | Detector Mount |
| EF-SP-CR-130 | CCD Head temperature comp... | Cryogenics | PD | CCD head temperature components |
| EF-SP-CR-140 | Electrical connections | Cryogenics | PD | Electrical connections |
| EF-SP-CR-150 | Cryostat window | Cryogenics | PD | Cryostat window |
| EF-SP-CR-200 | Cryostat Rear vessel | Cryogenics | PD | |
| EF-SP-CR-210 | Cryostat Rear Vessel envelope | Cryogenics | PD | Cryostat Rear vessel envelope |
| EF-SP-CR-220 | Cryostat Vessel Temperature | Cryogenics | PD | Cryostat Vessel Temperature components |
| EF-SP-CR-230 | Rear Vessel Electrical connect... | Cryogenics | PD | Rear Vessel electrical connections |
| EF-SP-CR-240 | Cryostat Pressure Components | Cryogenics | PD | Cryostat Pressure Components |
| EF-SP-CR-250 | LN2 exhaustion componets | Cryogenics | PD | LN2 exhaustion components |
| EF-SP-CR-300 | Detector Electronics | Cryogenics | PD | Detector Electronics |
| EF-SP-CR-310 | Marconi CCD44-82 (detector) | Cryogenics | DD | Marconi CCD44-82 (detector) |
| EF-SP-CR-320 | Cryostat Internal Panel | Cryogenics | DD | Cryostat Internal Panel |
| EF-SP-FE | Fibers Entrance Unit | Optics | CD | Fibers Entrance Unit |
| EF-SP-FL | Field Lens | Optics | PD | Field Lens |
| EF-SP-FW | Filter Wheel | Mechanics | PD | Filter wheel |
| EF-SP-GT | Grating Mechanism | Mechanics | PD | Grating Mechanism |
| EF-SP-SH | Shutter | Mechanics | PD | Shutter |
| EF-SP-SH-100 | Shutter Mechanism | Mechanics | CD | Shutter Mechanism |
| EF-SP-SH-200 | Shutter Controller | Mechanics | CD | Shutter Controller |
| EF-SP-SS | Support Structure | Mechanics | PD | Support Structure |
| IC | Infrared Camera | System | CD | IC is an infrared camera in the range 1 to 2.5 mic... |
| IC-CR | Infrared Camera Cryostat | System | CD | This is the IR camera cryostat inselde which all t... |
| IC-DE | Infrared Camera Detector Syst... | System | CD | This subsystem is composed by all the detectors... |
| IC-OP | Infrared Camera Optics | System | CD | This subsystem is composed by all the optics... |

Figure 24: PT element View showing all the PT or configuration elements introduced in the tool

Select a Product Tree element among the ones listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Product Tree Elements Form will be opened only with the selected record available.

PT Element Form

Code* Name*

Sub-subject* Date Status*

Description

Document related to the CE

| # | Document |
|----|----------|
| >> | |

1 from 1

Figure 25: PT Elements Form (only with the selected record)

B. Add a new record.

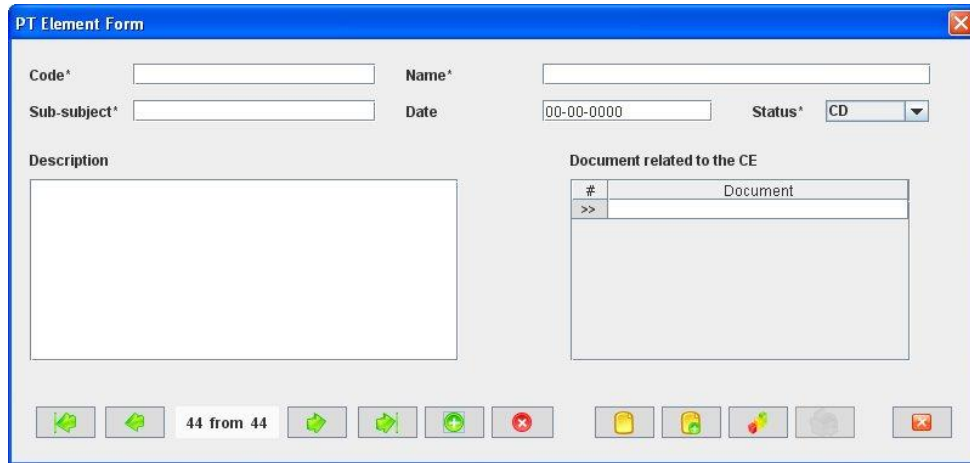
In the PT Elements form, new Product Tree elements can be created in two different ways:

B.I. Starting an empty Product Tree element.

In the PT Elements form (Figure 25), click the *Add button* to add a new record,



A new PT elements Form will be opened empty and ready to be filled.



PT Element Form

Code* Name*

Sub-subject* Date Status*

Description

Document related to the CE

| # | Document |
|----|----------|
| >> | |

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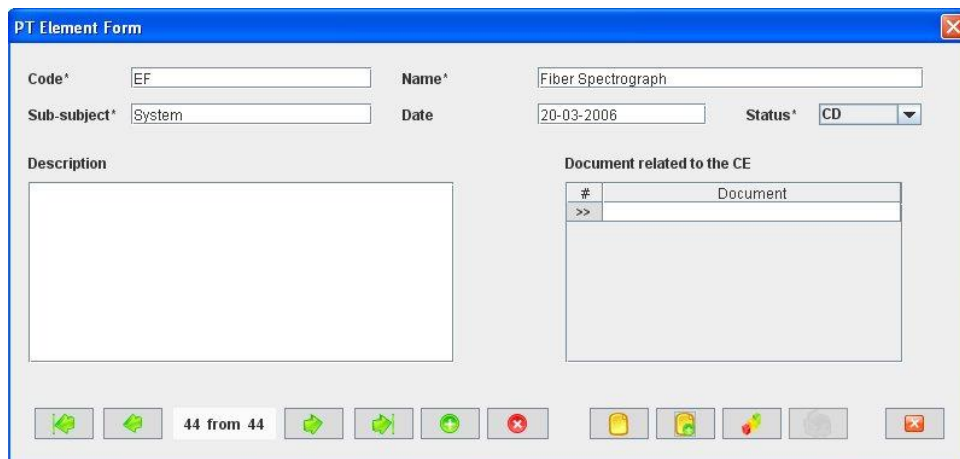
Figure 26 : PT Elements Form ready to introduce a new PT element without re-using information from other configuration elements already recorded in the database

B.II. Cloning an already existing Product Tree element.

In the PT Elements Form (Figure 25), click the *Copy button* to clone the Product Tree element that is currently selected in the form,



A new PT Elements Form will be opened with several fields cloned from the previous record and ready to be completed.



PT Element Form

Code* Name*

Sub-subject* Date Status*

Description

Document related to the CE

| # | Document |
|----|----------|
| >> | |

44 from 44

Figure 27: Configuration Elements Form ready to introduce a new PT element by cloning an existing configuration element (an existing record). In this case we are cloning record #1 (see Figure 23)

C. Fill in the new record.

In the PT Elements Form, the mandatory fields that must be filled in are the following ones:



- **Code.** Indicate the Product Tree element Code. The Code must be unique for each Product Tree element because it is going to be used as the base to automatically generate other codes in the application such as Requirements and Documents. If a code equal to another one already assigned to the database is used, the tool gives a warning and the record cannot be saved. This is a text field and the maximum length of this field is 50 characters.

The code pattern is as follows:

AA-AA-AA-AA

where:

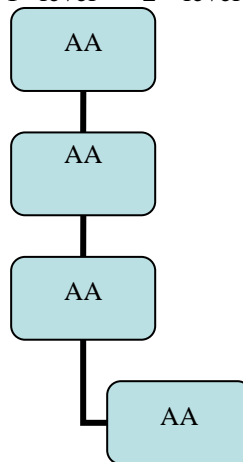
AA: Product Tree Element acronym to be defined as any combination of alphanumeric characters (excluding the "%"). The length of this acronym is not fixed.

The PT element code convention is defined before starting to use GECO. More information about it can be found in section 16.

It is very important to define correctly the PT Elements Codes because the Product Tree structure (i.e., the dependency among the different levels of the PT elements) is established according to the Codes. GECO takes into account where the separator (in this case, "-") is to decide in which PT level each element is and, also, from which PT high level element this element is hanging.

AA-AA-AA-AA

1st level - 2nd level - 3rd level - 4th level



- **Name.** Describe the element in a short and concise way as possible. This is a text field and the maximum length of this field is 200 characters.
- **Sub-subject.** Indicate which subsystem (or group inside the organization) is responsible for this Product Tree element. This is a text field and the maximum length of this field is 20 characters.
- **Status combo box.** Select the status of the Product Tree element among the options offered in the Status combo box, which includes the following ones:
 - CD (Conceptual Design)

- PD (Preliminary Design)
- DD (Detailed Design)
- PRD (PRoDuction Phase)

By default, the reference line is “CD”.

If any of the mandatory fields are not filled, then the tool gives an alert and the record cannot be saved until all the mandatory fields have been introduced.

The rest of the fields that could be filled are the following ones:

- **Date.** Indicate the creation date of the Product Tree element. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Description.** Describe the Product Tree element providing all the information that can be useful to keep about it. This is a text field and it does not have a maximum length limit.
- **Document codes related to the Configuration Element combo box.** Select the code of the documents that are related to the Product Tree Element. In the combo box, all documents existing in the application can be selected and the user can select as many documents as wanted.

D. Save the new record.

In the Product Tree elements Form, click the *Save button* to save the record,



If the current record is not saved, the new record will not be created.

E. Close the Product Tree elements Form

In the Product Tree elements Form, click the *Exit button* to exit the form,



If the record has been saved, the Configuration Elements Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 28: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Configuration Elements Form.

5.3 Selecting a particular Product Tree Element

In the Main window, the form view of a particular Product Tree element can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *PT elements Form* or press *ALT+O+E*.

In order to find a particular Product Tree element, the following actions can be done:

\Rightarrow Use the arrows for moving among the Product Tree elements currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record among the selected ones

\Rightarrow Use the *Filter button* to filter/un-filter the set of Product Tree elements currently selected in the form,



A new window will appear:

\Rightarrow Click *Data filter activated box* to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),

\Rightarrow select in the *Field combo box* the desired field to filter the data,

\Rightarrow select in the *Op combo box* how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, and “ending by”)

\Rightarrow write in the *Value* text field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

\Rightarrow define as many filters as wanted (by adding new lines),

\Rightarrow click *Accept*,

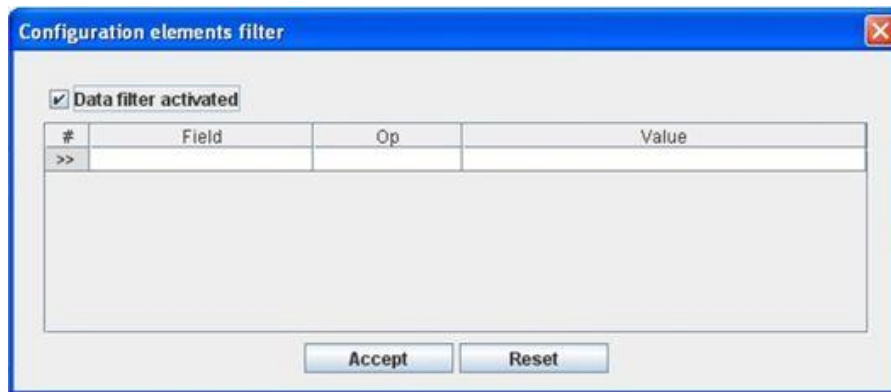


Figure 29: Filter Window for the Configuration Element View to filter PT elements by fields

B. Selecting the Product Tree elements in the Product Tree elements View.

In the Main window, click the *Views Menu* \Rightarrow *PT elements View* or press *ALT+V+E*.

In order to constrain (by Product Tree Element or by filtering) the number of Product Tree elements listed in the view, see the steps to be followed in section 4.2.

Select the desired Product Tree element among the Product Tree elements listed in the table at the right side of the window by double-clicking with the left button of the mouse.

5.4 Modifying existing Product Tree Elements

The Product Tree element to be modified must be already selected, which will be done by following the steps described in section 5.3.

In the Product Tree elements Form, the following steps must be completed in order to modify the selected Product Tree element.

A. Modify the desired fields.

Make the desired changes in the Product Tree element fields, taking into account all constraints identified in section 5.2, numbered item C).

All the fields in the Product Tree elements Form can be modified.

B. Save the modified record.

In the Product Tree elements Form, click the *Save button* to save the record,



If the record is not saved, the changes will not be applied.

C. Close the Product Tree elements form

In the Product Tree elements Form, click the *Exit button* to exit the form,



If the record has been saved, the Product Tree elements Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 30: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Configuration Elements Form.

5.5 Deleting a Product Tree Element

The Product Tree element to be deleted must be already selected, which will be done by following the steps described in section 5.3.

In the Product Tree elements Form, the following steps must be done in order to delete the selected Product Tree element.

A. Delete the record.

In the Product Tree elements Form, click the *Delete button* to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.



Figure 31: Warning Window to check if the user wants to delete a record

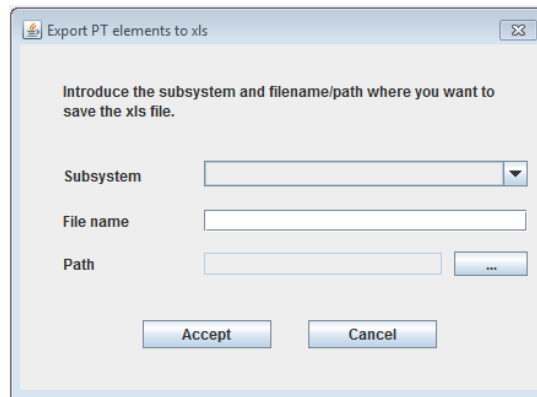
⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

5.6 Export PT elements to XLS

In the Main window, click the *Tools Menu* ⇒ *Export PT elements to XLS*.

A new window will appear where the user must, first, introduce the subsystem and the file name and path to save the xls file, then, click *Accept*.



Export PT elements to xls

Introduce the subsystem and filename/path where you want to save the xls file.

Subsystem:

File name:

Path: ...

Accept Cancel

Figure 32: Window to insert the subsystem and filename/path to generate the xls file

A new window (it is necessary to have installed any xls viewer) will show a list of the PT elements of the subsystem and lower level elements that has been just introduced.

| | A | B | C |
|----|--------------|---|--|
| | Code | Name | Description |
| 1 | EF | Fiber Spectrograph | This instrument is composed by an optical fibers robot (which is rotat |
| 2 | EF-AD | Atmospheric Dispersion Corrector | Optical system that allows to compensate the atmospheric dispersion |
| 3 | EF-CF | Field Curvature Corrector | Optical system that corrects the telescope focal plane curvature and |
| 4 | EF-CM | Calibration Module | System with different types of lamps (arc lamps, halogen, etc.) that a |
| 5 | EF-CS | Control System | Instrument Control System including hardware and software. The soft |
| 6 | EF-CU | High level User Software Control System | This subsystem includes the high level user-oriented software packag |
| 7 | EF-EC | Electronic Cabinets | Cabinets containing the mechanisms drives controllers, the pressure |
| 8 | EF-FS | Optical fibers | Optical fibers, micro-lenses and associated support opto-mechanics. |
| 9 | EF-RA | Telescope Rotator Adapter | This is the mechanical interface between the robot and the Telescope |
| 10 | EF-RB | Focal Plane Robot | Robot that can position several mechanical articulated arms independ |
| 11 | EF-SP | Spectrograph | The instrument produces the spectra of the light drove through the fib |
| 12 | EF-SP-CA | Camera | Camera of the spectrograph to focus the light coming from the collim |
| 13 | EF-SP-CB | Cabling | Cabling |
| 14 | EF-SP-CO | Collimator | Collimator that produces a collimated beam where the different pupil e |
| 15 | EF-SP-CR | Cryostat | |
| 16 | EF-SP-CR-100 | CCD Head | CCD Head |
| 17 | EF-SP-CR-110 | CCD Head external body | CCD head external body |
| 18 | EF-SP-CR-120 | Detector Mount | Detector Mount |
| 19 | EF-SP-CR-130 | CCD Head temperature components | CCD head temperature components |
| 20 | EF-SP-CR-140 | Electrical connections | Electrical connections |
| 21 | EF-SP-CR-150 | Cryostat window | Cryostat window |
| 22 | EF-SP-CR-200 | Cryostat Rear vessel | |
| 23 | EF-SP-CR-210 | Cryostat Rear Vessel envelope | Cryostat Rear vessel envelope |
| 24 | EF-SP-CR-220 | Cryostat Vessel Temperature components | Cryostat Vessel Temperature components |
| 25 | EF-SP-CR-230 | Rear Vessel Electrical connections | Rear Vessel electrical connections |
| 26 | EF-SP-CR-240 | Cryostat Pressure Components | Cryostat Pressure Components |
| 27 | EF-SP-CR-250 | LN2 exhaustion components | LN2 exhaustion components |
| 28 | EF-SP-CR-300 | Detector Electronics | Detector Electronics |
| 29 | EF-SP-CR-310 | Marconi CCD44-82 (detector) | Marconi CCD44-82 (detector) |
| 30 | EF-SP-CR-320 | Cryostat Internal Panel | Cryostat Internal Panel |
| 31 | EF-SP-FE | Fibers Entrance Unit | Fibers Entrance Unit |
| 32 | EF-SP-FL | Field Lens | Field Lens |
| 33 | | | |

Figure 33: After entering the subsystem, this window will show the result of the search of all the PT elements of this subsystem and lower level elements found in the database.

6. PARTS

6.1 What is a Part?

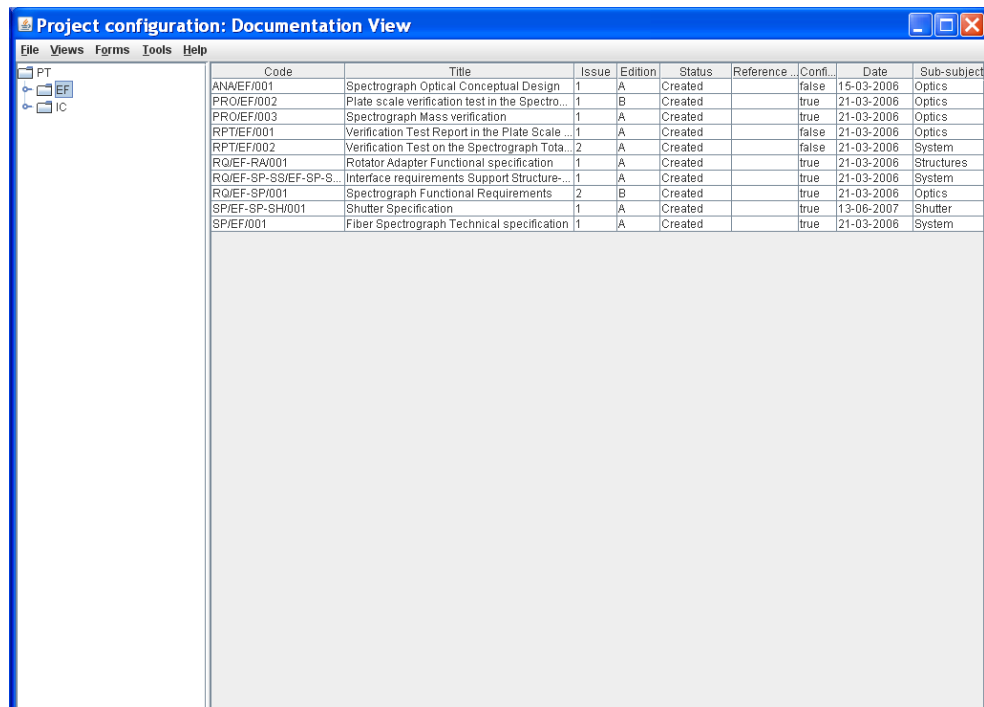
A Part is the lowest level that can be reached in a system breaking up.

In order to maintain a complete inventory of the system, it is important to correctly identify all the system's parts.

The information about parts will be also needed to define in detail the maintenance activities of the whole system.

6.2 Creating a new Part

Starting at the Main Window of the application,



| Code | Title | Issue | Edition | Status | Reference... | Conf. | Date | Sub-subject |
|------------------------|---|-------|---------|---------|--------------|-------|------------|-------------|
| ANA/EF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics |
| PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics |
| PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics |
| RPT/EF/001 | Verification Test Report in the Plate Scale ... | 1 | A | Created | | false | 21-03-2006 | Optics |
| RPT/EF/002 | Verification Test on the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System |
| RO/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures |
| RO/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure... | 1 | A | Created | | true | 21-03-2006 | System |
| RO/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics |
| SP/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter |
| SP/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System |

Figure 34: Main window of the application

The following steps must be executed in order to create a new Part:

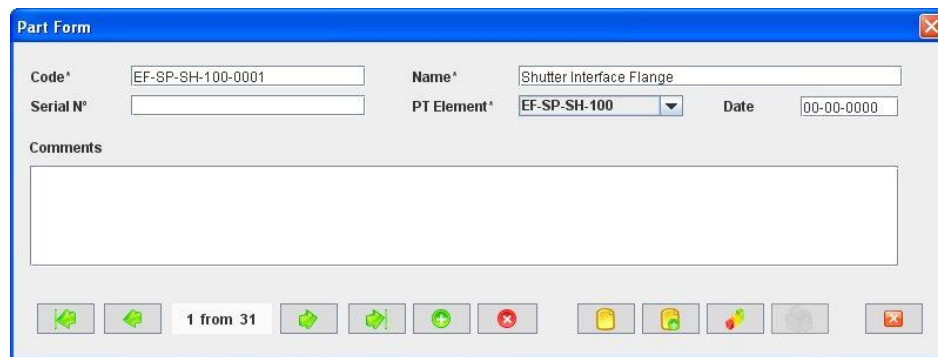
A. Open the Parts form.

In the Main window, the Parts form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Parts Form* or press *ALT+O+P*.

The Parts Form will be opened with all available records selected.



Part Form

Code* Name*

Serial N° PT Element* Date


Comments

1 from 31

Figure 35: Parts Form with all the selected records

A.II. Selecting a Part in the Parts View

In the Main window, click the *Views Menu* \Rightarrow *Parts View* or press *ALT+V+P*.



Project configuration: Parts View


File Views Forms Tools Help

| PT | Code | Name | Serial # | Configuration element | Date | |
|----------|-------------------|----------------------------------|----------|-----------------------|------------|----------------|
| EF | EF-SP-SH-100-0001 | Shutter Interface Flange | | EF-SP-SH-100 | | |
| EF-AD | EF-SP-SH-100-0002 | Lower light-well A | | EF-SP-SH-100 | | Lower light |
| EF-CF | EF-SP-SH-100-0003 | Lower light-well B | | EF-SP-SH-100 | | Lower light |
| EF-CM | EF-SP-SH-100-0004 | Shutter plate | | EF-SP-SH-100 | | Shutter pl |
| EF-CS | EF-SP-SH-100-0005 | Anchor | | EF-SP-SH-100 | | Anchor |
| EF-CU | EF-SP-SH-100-0006 | Anchor clamp | | EF-SP-SH-100 | | Anchor cl |
| EF-EC | EF-SP-SH-100-0007 | Sliding piece | | EF-SP-SH-100 | | Sliding pie |
| EF-FS | EF-SP-SH-100-0008 | Actuator | | EF-SP-SH-100 | | Actuator |
| EF-RA | EF-SP-SH-100-0009 | Microswitch support | | EF-SP-SH-100 | | Microswit |
| EF-RB | EF-SP-SH-100-0010 | Tensing piece | | EF-SP-SH-100 | | Tensing p |
| EF-SP | EF-SP-SH-100-0011 | Synchronous disc B | | EF-SP-SH-100 | | Synchron |
| IC | EF-SP-SH-100-0012 | Shutter flange | | EF-SP-SH-100 | | Shutter fla |
| IC-CR | EF-SP-SH-100-0013 | Junction | | EF-SP-SH-100 | | Junction |
| IC-DE | EF-SP-SH-100-0014 | Connector support | | EF-SP-SH-100 | | Connecto |
| IC-OP | EF-SP-SH-100-0015 | End-of-travel block | | EF-SP-SH-100 | | End-of-tra |
| IC-OP-FI | EF-SP-SH-100-0016 | End-of-travel block screw | | EF-SP-SH-100 | | End-of-tra |
| | EF-SP-SH-100-0017 | Cover A | | EF-SP-SH-100 | | Cover A |
| | EF-SP-SH-100-0018 | Cover B | | EF-SP-SH-100 | | Cover B |
| | EF-SP-SH-100-0019 | Motor cover A | | EF-SP-SH-100 | | Motor cove |
| | EF-SP-SH-100-0020 | Motor cover B | | EF-SP-SH-100 | | Motor cove |
| | EF-SP-SH-100-0021 | Motor cover C | | EF-SP-SH-100 | | Motor cove |
| | EF-SP-SH-100-0022 | Shutter cover A | | EF-SP-SH-100 | | Shutter co |
| | EF-SP-SH-100-0023 | Shutter cover B | | EF-SP-SH-100 | | Shutter co |
| | EF-SP-SH-100-0024 | Shutter cover C | | EF-SP-SH-100 | | Shutter co |
| | EF-SP-SH-100-0025 | Upper light-well | | EF-SP-SH-100 | | Upper light |
| | EF-SP-SH-100-0026 | Support studs | | EF-SP-SH-100 | | Support st |
| | EF-SP-SH-100-0027 | Base plate | | EF-SP-SH-100 | | Base plat |
| | IC-OP-FI-0001 | J filter. Broad-band filter | | IC-OP-FI | 29-08-2007 | J filter for t |
| | IC-OP-FI-0002 | H filter. Broad-band filter | | IC-OP-FI | 29-08-2007 | H filter for |
| | IC-OP-FI-0003 | K filter. Broad-band filter | | IC-OP-FI | 29-08-2007 | K filter for |
| | IC-OP-FI-0004 | Bracket Gamma Narrow Band Filter | | IC-OP-FI | 29-12-2006 | This is a r |

Figure 36: Parts Views. All the parts of the selected PT elements are shown

Select a Part among the Parts listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Parts Form will be opened only with the selected record available.



The screenshot shows the 'Part Form' window with the following fields and values:

| Field | Value |
|-------------|-------------------|
| Code* | EF-SP-SH-100-0006 |
| Name* | Anchor clamp |
| Serial N° | |
| PT Element* | EF-SP-SH-100 |
| Date | 00-00-0000 |
| Comments | Anchor clamp |

The bottom status bar indicates '1 from 1'.

Figure 37: Parts Form (only with the selected record)

B. Add a new record.

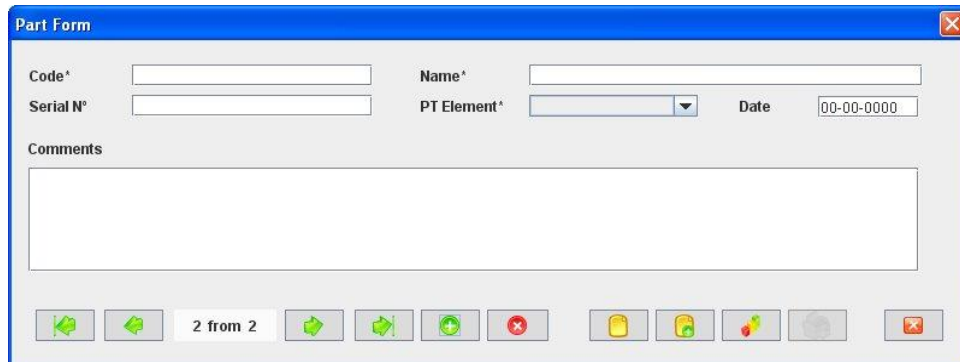
In the Parts Form, new Parts can be created in two different ways:

B.I. Starting an empty Part.

In the Parts Form, click the *Add button* to add a new record,



A new Part element form will be opened empty and ready to be filled.



The screenshot shows the 'Part Form' window with the following fields and values:

| Field | Value |
|-------------|------------|
| Code* | |
| Name* | |
| Serial N° | |
| PT Element* | |
| Date | 00-00-0000 |
| Comments | |

The bottom status bar indicates '2 from 2'.

Figure 38: Parts Form ready to introduce a new part without re-using information from other part already recorded in the database

B.II. Cloning an already existing Part.

In the Parts Form, click the *Copy button* to clone the Part that is currently selected in the form,



A new Parts Form will be opened with several fields cloned from the previous record and ready to be completed.

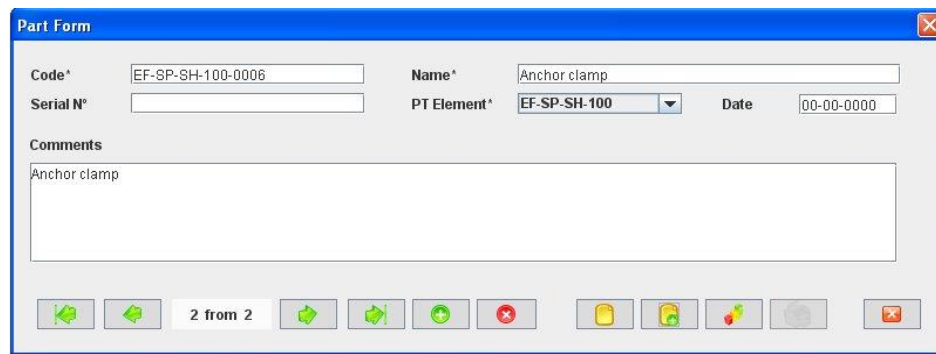


Figure 39: Parts Form ready to introduce a new part by cloning an existing record

C. Fill in the new record.

In the Part Form, the mandatory fields that must be filled in are the following ones:

- **Code.** Indicate the Part Code. The Code must be unique for each Part. This is a text field and the maximum length of this field is 80 characters. If an already used code is enter in the field, at the time of exit the form, the tool will send a warning saying that the code already exist in the database and does not allowed to save the record.
- **Name.** Describe the Part in a short and concise way as possible. This is a text field and the maximum length of this field is 100 characters.
- **PT element combo box.** Select which PT element is on top of the Part. In the combo box, all Product Tree elements existing in the application can be selected.

If any of the mandatory fields are not filled, then the tool gives an alert and the record cannot be saved until all the mandatory fields have been introduced.

The rest of the fields that could be filled are the following ones:

- **Serial#.** Indicate the production serial number of the Part. This is a text field and the maximum length of this field is 50 characters.
- **Date.** Indicate the creation date of the Part. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Comments.** Describe any additional information that can be useful to be kept about the Part. This is a text field and the maximum length of this field is 400 characters.

D. Save the new record.

In the Parts Form, click the *Save button* to save the record,



If the current record is not saved, the new record will not be created.

E. Close the Parts Form

In the Parts Form, click the *Exit button* to exit the form,



If the record has been saved, the Parts Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

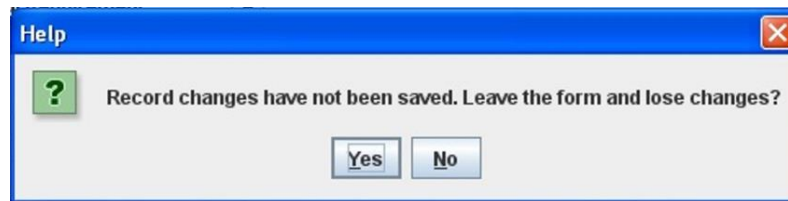


Figure 40: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Parts Form.

6.3 Selecting a particular Part

In the Main window, the form view of a particular Part can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms Menu* ⇒ *Parts Form* or press *ALT+O+P*.

In order to find a particular Part, the following actions can be done:

⇒ Use the arrows for moving among the Parts currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

⇒ Use the *Filter button* to filter/un-filter the set of Parts currently selected in the form,



A new window will appear:

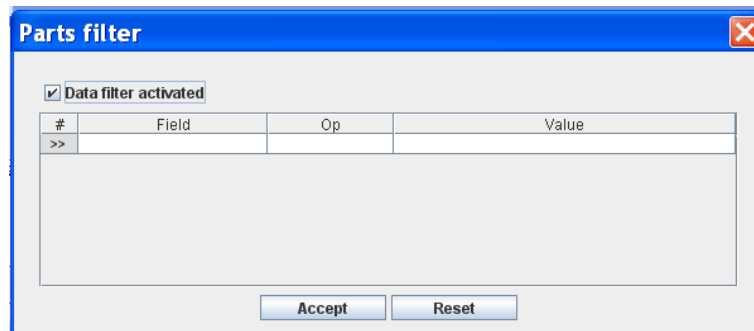
⇒ Click *Data filter activated box* to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be record),

⇒ select in the *Field combo box* the desired field to filter the data,

⇒ select in the *Op combo box* how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

⇒ write in the *Value* text field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

- ⇒ define as many filters as wanted (by adding new lines),
- ⇒ click *Accept*,



The dialog box titled "Parts filter" has a close button (X) in the top right corner. It contains a checkbox labeled "Data filter activated" which is checked. Below this is a table with four columns: "#", "Field", "Op", and "Value". The first row of the table has a ">>" button in the "#" column and empty fields in the others. Below the table are two buttons: "Accept" and "Reset".

| # | Field | Op | Value |
|----|-------|----|-------|
| >> | | | |

Figure 41: Form to filter the parts

B. Selecting the Parts in the Parts View.

In the Main window, click the *Views Menu* ⇒ *Parts View* or press *ALT+V+P*.

In order to constrain (by Product Tree Element or by filtering) the number of Parts listed in the view, see the steps to be followed in section 4.2.

Select the desired Part among the Parts listed in the table at the right side of the window by double-clicking with the left button of the mouse.

6.4 Modifying existing Parts

The Part to be modified must be already selected, which will be done by following the steps described in section 6.3.

In the Parts Form, the following steps must be done in order to modify the selected Part.

A. Modify the desired fields.

Make the desired changes in the Part fields, taking into account all constraints identified in section 6.2, numbered item C).

All the fields in the Parts form can be modified.

B. Save the modified record.

In the Parts Form, click the *Save button* to save the record,



If the record is not saved, the changes will not be applied.

C. Close the Parts form

In the Parts Form, click the *Exit button* to exit the form,



If the record has been saved, the Parts Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

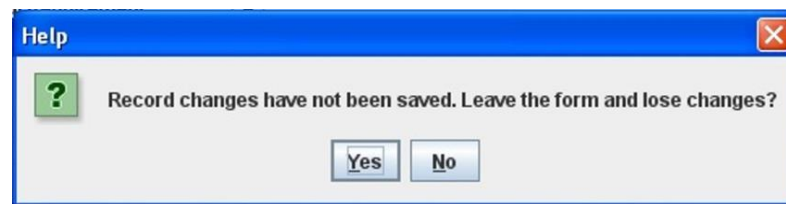


Figure 42: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Parts Form.

6.5 Deleting a Part

The Part to be deleted must be already selected, which will be done by following the steps described in section 6.3.

In the Parts Form, the following steps must be done in order to delete the selected Part.

A. Delete the record.

In the Parts Form, click the *Delete button* to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

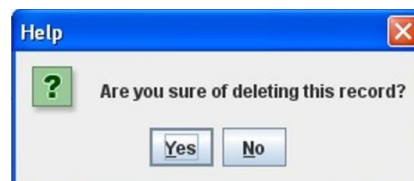


Figure 43: Warning Window to check if the user wants to delete the record

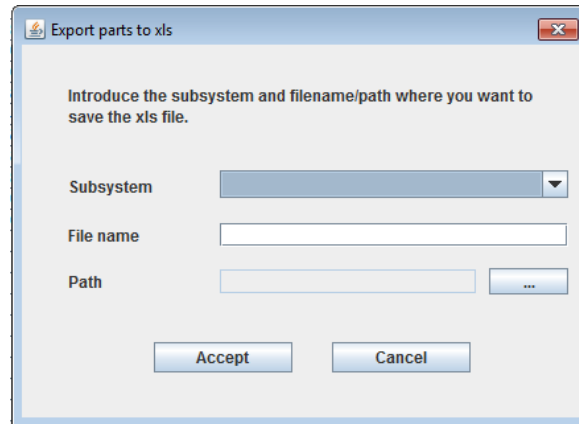
⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

6.6 Export Parts to XLS

In the Main window, click the *Tools Menu* ⇒ *Export Parts to XLS*.

A new window will appear where the user must, first, introduce the subsystem and the file name and path to save the xls file, then, click *Accept*.



Export parts to xls

Introduce the subsystem and filename/path where you want to save the xls file.

Subsystem:

File name:

Path: ...

Accept Cancel

Figure 44: Window to insert the subsystem and filename/path to generate the xls file

A new window (it is necessary to have installed any xls viewer) will show a list of the parts of the subsystem and lower level elements that has been just introduced.

| | A | B | C | D | E | F |
|----|-------------------|---------------------------|--------------|---------------|---------------------------|---|
| | Code | Name | PT Element | Serial number | Comments | |
| 1 | EF-SP-SH-100-0001 | Shutter Interface Flange | EF-SP-SH-100 | | | |
| 2 | EF-SP-SH-100-0002 | Lower light-well A | EF-SP-SH-100 | | Lower light-well A | |
| 3 | EF-SP-SH-100-0003 | Lower light-well B | EF-SP-SH-100 | | Lower light-well B | |
| 4 | EF-SP-SH-100-0004 | Shutter plate | EF-SP-SH-100 | | Shutter plate | |
| 5 | EF-SP-SH-100-0005 | Anchor | EF-SP-SH-100 | | Anchor | |
| 6 | EF-SP-SH-100-0006 | Anchor clamp | EF-SP-SH-100 | | Anchor clamp | |
| 7 | EF-SP-SH-100-0007 | Sliding piece | EF-SP-SH-100 | | Sliding piece | |
| 8 | EF-SP-SH-100-0008 | Actuator | EF-SP-SH-100 | | Actuator | |
| 9 | EF-SP-SH-100-0009 | Microswitch support | EF-SP-SH-100 | | Microswitch support | |
| 10 | EF-SP-SH-100-0010 | Tensing piece | EF-SP-SH-100 | | Tensing piece | |
| 11 | EF-SP-SH-100-0011 | Synchronous disc B | EF-SP-SH-100 | | Synchronous disc B | |
| 12 | EF-SP-SH-100-0012 | Shutter flange | EF-SP-SH-100 | | Shutter flange | |
| 13 | EF-SP-SH-100-0013 | Junction | EF-SP-SH-100 | | Junction | |
| 14 | EF-SP-SH-100-0014 | Connector support | EF-SP-SH-100 | | Connector support | |
| 15 | EF-SP-SH-100-0015 | End-of-travel block | EF-SP-SH-100 | | End-of-travel block | |
| 16 | EF-SP-SH-100-0016 | End-of-travel block screw | EF-SP-SH-100 | | End-of-travel block screw | |
| 17 | EF-SP-SH-100-0017 | Cover A | EF-SP-SH-100 | | Cover A | |
| 18 | EF-SP-SH-100-0018 | Cover B | EF-SP-SH-100 | | Cover B | |
| 19 | EF-SP-SH-100-0019 | Motor cover A | EF-SP-SH-100 | | Motor cover A | |
| 20 | EF-SP-SH-100-0020 | Motor cover B | EF-SP-SH-100 | | Motor cover B | |
| 21 | EF-SP-SH-100-0021 | Motor cover C | EF-SP-SH-100 | | Motor cover C | |
| 22 | EF-SP-SH-100-0022 | Shutter cover A | EF-SP-SH-100 | | Shutter cover A | |
| 23 | EF-SP-SH-100-0023 | Shutter cover B | EF-SP-SH-100 | | Shutter cover B | |
| 24 | EF-SP-SH-100-0024 | Shutter cover C | EF-SP-SH-100 | | Shutter cover C | |
| 25 | EF-SP-SH-100-0025 | Upper light-well | EF-SP-SH-100 | | Upper light-well | |
| 26 | EF-SP-SH-100-0026 | Support studs | EF-SP-SH-100 | | Support studs | |
| 27 | EF-SP-SH-100-0027 | Base plate | EF-SP-SH-100 | | Base plate | |
| 28 | | | | | | |
| 29 | | | | | | |

Figure 45: After entering the subsystem, this window will show the result of the search of all the parts of this subsystem and lower level elements found in the database.

7. INTERFACES

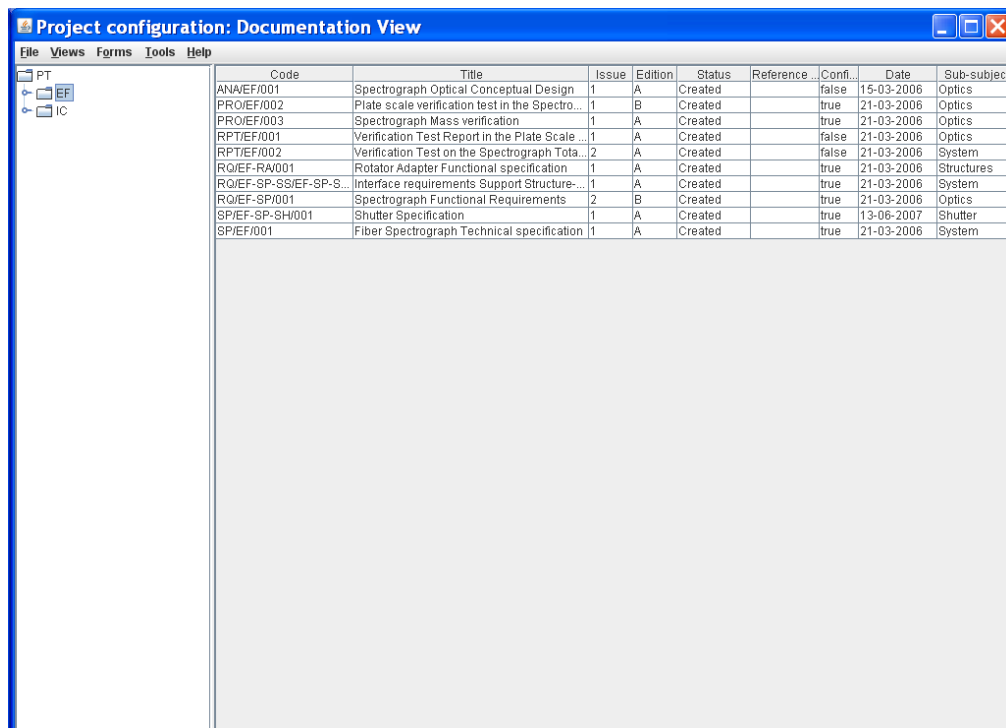
7.1 What is an Interface?

An Interface is defined as the border between two subsystems (hardware or software). Interfaces among subsystems that are under the responsibility of different working groups are especially important to be controlled.

The interfaces must be identified and introduced in the application during the system design in order to avoid any problems during the integration of the system.

7.2 Creating a new Interface

Starting at the Main Window of the application,



| Code | Title | Issue | Edition | Status | Reference | Conf. | Date | Sub-subject |
|------------------------|---|-------|---------|---------|-----------|-------|------------|-------------|
| ANA/EF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics |
| PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics |
| PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics |
| RPT/EF/001 | Verification Test Report in the Plate Scale... | 1 | A | Created | | false | 21-03-2006 | Optics |
| RPT/EF/002 | Verification Test on the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System |
| RQ/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures |
| RQ/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure... | 1 | A | Created | | true | 21-03-2006 | System |
| RQ/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics |
| SP/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter |
| SP/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System |

Figure 46: Main window of the application

The following steps must be executed in order to create a new Interface:

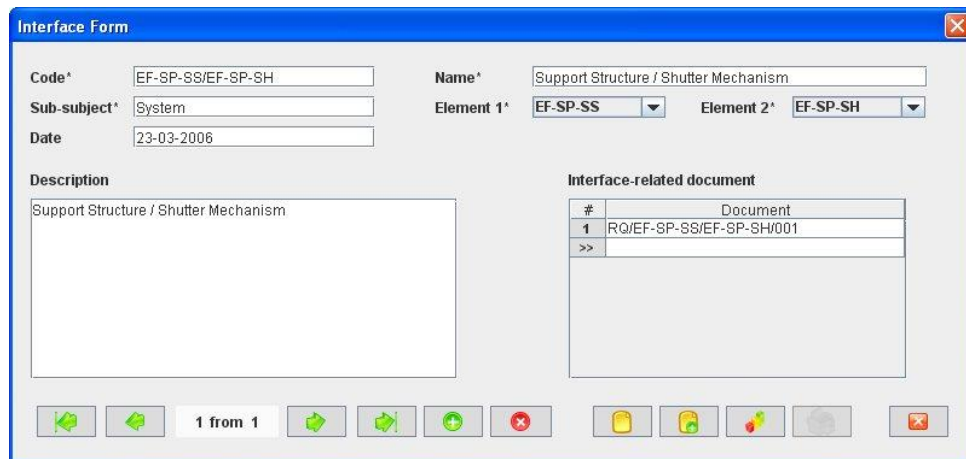
A. Open the Interface form.

In the Main window, the Interfaces form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Interfaces Form* or press *ALT+O+I*.

The Interfaces Form will be opened with all available records selected.



Interface Form

Code*: EF-SP-SS/EF-SP-SH Name*: Support Structure / Shutter Mechanism

Sub-subject*: System Element 1*: EF-SP-SS Element 2*: EF-SP-SH

Date: 23-03-2006

Description: Support Structure / Shutter Mechanism

Interface-related document

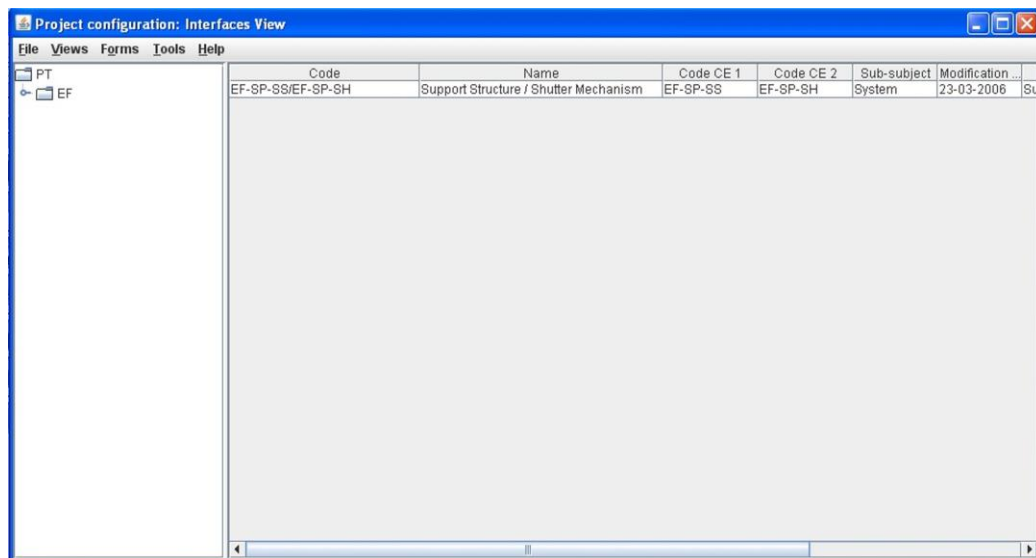
| # | Document |
|----|--------------------------|
| 1 | RQ/EF-SP-SS/EF-SP-SH/001 |
| >> | |

1 from 1

Figure 47: Interfaces Form with all selected records

A.II. Selecting an Interface in the Interfaces View.

In the Main window, click the *Views Menu* ⇒ *Interfaces View* or press **ALT+V+I**.



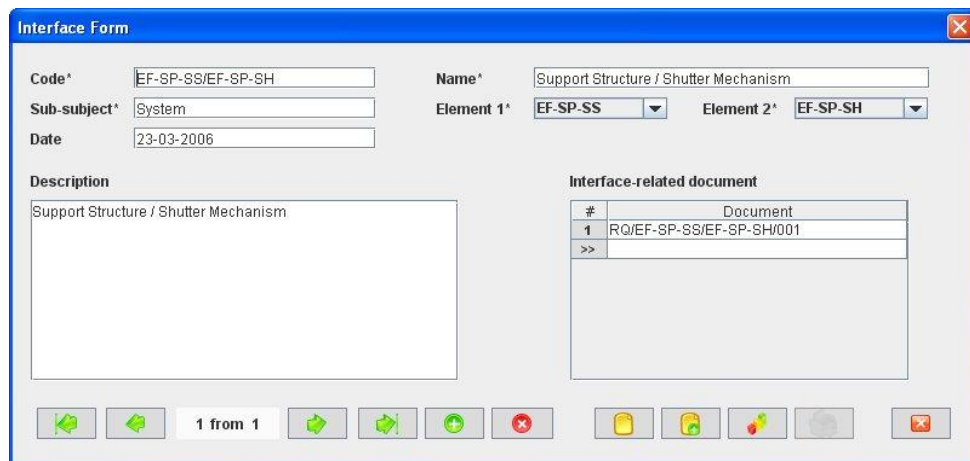
Project configuration: Interfaces View

| Code | Name | Code CE 1 | Code CE 2 | Sub-subject | Modification |
|-------------------|---------------------------------------|-----------|-----------|-------------|--------------|
| EF-SP-SS/EF-SP-SH | Support Structure / Shutter Mechanism | EF-SP-SS | EF-SP-SH | System | 23-03-2006 |

Figure 48: Interfaces View with all the recorded interfaces shown on the right panel

Select an Interface among the Interfaces listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Interfaces Form will be opened only with the selected record available.



The screenshot shows the 'Interface Form' window. It contains several input fields: 'Code*' with value 'EF-SP-SS/EF-SP-SH', 'Name*' with value 'Support Structure / Shutter Mechanism', 'Sub-subject*' with value 'System', 'Date' with value '23-03-2006', 'Element 1*' with value 'EF-SP-SS', and 'Element 2*' with value 'EF-SP-SH'. There is a 'Description' text area with the text 'Support Structure / Shutter Mechanism'. To the right, there is a table titled 'Interface-related document' with two columns: '#' and 'Document'. The table contains one row with '#' value '1' and 'Document' value 'RQ/EF-SP-SS/EF-SP-SH/001'. Below the table is a '>>' button. At the bottom of the form, there is a status bar showing '1 from 1' and several icons for navigation and actions.

Figure 49: Interfaces Form showing only the selected record

B. Add a new record.

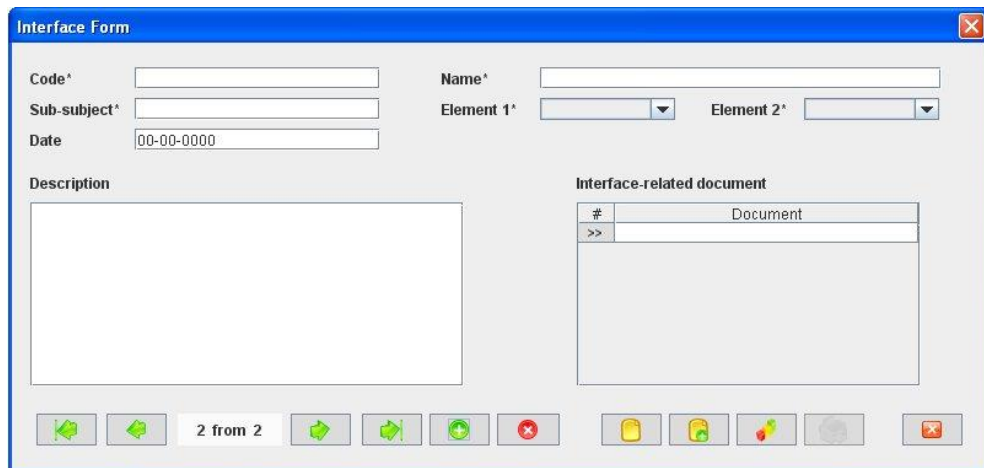
In the Interfaces Form, new Interfaces can be created in two different ways:

B.I. Starting an empty Interface.

In the Interface Form, click the *Add* button to add a new record,



A new Interface element form will be opened empty and ready to be filled.



The screenshot shows the 'Interface Form' window in its initial state. The 'Code*' field is empty, 'Name*' is empty, 'Sub-subject*' is empty, 'Date' has the default value '00-00-0000', 'Element 1*' is empty, and 'Element 2*' is empty. The 'Description' text area is empty. The 'Interface-related document' table is empty, showing only the column headers '#' and 'Document'. Below the table is a '>>' button. At the bottom of the form, the status bar shows '2 from 2' and several icons for navigation and actions.

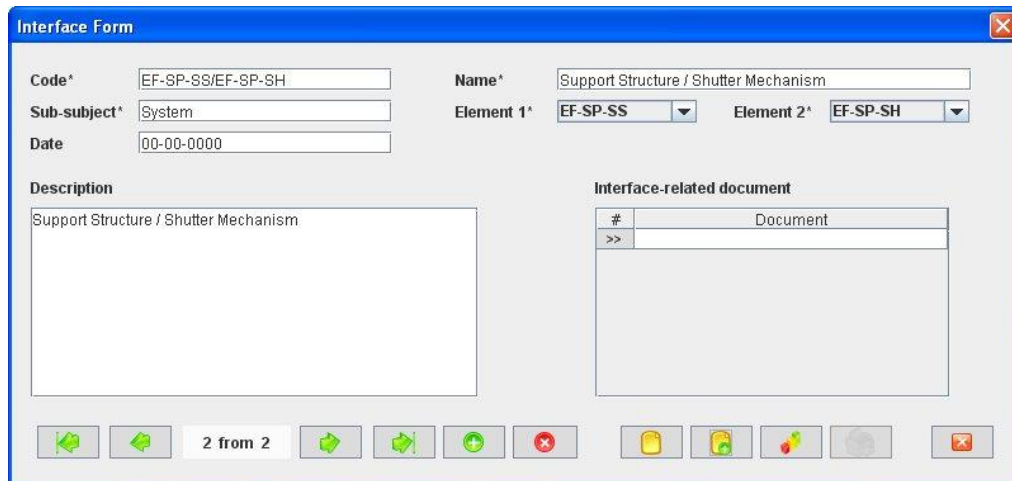
Figure 50: Interface Form ready to introduce a new interface without re-using information from other part already recorded in the database

B.II. Cloning an already existing Interface.

In the Interfaces Form, click the *Copy button* to clone the Interface that is currently selected in the form,



A new Interfaces Form will be opened with several fields cloned from the previous record and ready to be completed.



The screenshot shows the 'Interface Form' window. It contains the following fields and controls:

- Code***: Text field with value 'EF-SP-SS/EF-SP-SH'.
- Name***: Text field with value 'Support Structure / Shutter Mechanism'.
- Sub-subject***: Text field with value 'System'.
- Date**: Text field with value '00-00-0000'.
- Description**: Text area with value 'Support Structure / Shutter Mechanism'.
- Element 1***: Dropdown menu with value 'EF-SP-SS'.
- Element 2***: Dropdown menu with value 'EF-SP-SH'.
- Interface-related document**: Table with columns '#' and 'Document'. The table is empty.
- Buttons**: A row of buttons at the bottom, including 'Copy', 'Paste', '2 from 2', 'Save', 'Cancel', 'Print', 'Help', and 'Close'.

Figure 51: Interface Form ready to introduce a new part by cloning an existing record

C. Fill in the new record.

In the Interface Form, the mandatory fields that must be filled in are the following ones:

- **Code.** Indicate the Interface Code. The Code must be unique for each Interface because it is going to be used as a base to automatically generate other codes in the application such as Requirements and Documents. This is a text field and the maximum length of this field is 110 characters. Be aware that the IF code is not automatically generated to give the user flexibility to use their own codes but it should be connected to the related PT elements codes. Also, there will be possible to define several interfaces between the same configuration elements although this is not a common practice, it could be used by some organizations.
- **Name.** Describe the Interface in a short and concise way as possible. This is a text field and the maximum length of this field is 80 characters.
- **Sub-subject.** Indicate which subsystem (or group inside the organization) is responsible for this Interface. This is a text field and the maximum length of this field is 20 characters.
- **Element 1 combo box.** The interface is defined in the border between two PT elements. Select the first one of this two PT element. In the combo box, all Product Tree elements existing in the application can be selected.
- **Element 2 combo box.** The interface is defined in the border between two PT elements. Select the second one of this two PT element. In the combo box, all Product Tree elements existing in the application will be accessible.

If any of the mandatory fields are not filled, then the tool gives an alert and the record cannot be saved until all the mandatory fields have been introduced.

The rest of the fields that could be filled are the following ones:

- **Date.** Indicate the creation date of the Interface. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Description.** Describe any additional information that can be useful to be kept about the Interface. This is a text field and it does not have a maximum length limit.
- **Interface-related documents combo box.** Select the code of the documents that are related to the Interface. In the combo box, all documents existing in the application can be selected and the user can select as many documents as wanted.

D. Save the new record.

In the Interfaces Form, click the *Save button* to save the record,



If the current record is not saved, the new record will not be created.

E. Close the Interfaces Form

In the Interfaces Form, click the *Exit button* to exit the form,



If the record has been saved, the Interfaces Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 52: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Interfaces Form.

7.3 Selecting a particular Interface

In the Main window, the form view of a particular Interface can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms Menu* ⇒ *Interfaces Form* or press *ALT+O+I*.

In order to find a particular Interface, the following actions can be done:

⇒ Use the arrows for moving among the Interfaces currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

⇒ Use the *Filter button* to filter/un-filter the set of Interfaces currently selected in the form,



A new window will appear:

⇒ Click *Data filter activated box* to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be reset),

⇒ select in the *Field combo box* the desired field to filter the data,

⇒ select in the *Op combo box* how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

⇒ write in the *Value* text field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

⇒ define as many filters as wanted (by adding new lines),

⇒ click *Accept*,



The dialog box titled "Interface Filters" contains a checked checkbox "Data filter activated". Below it is a table with four columns: "#", "Field", "Op", and "Value". The first row has a ">>" button in the "#" column and empty text boxes in the others. Below the table is a large empty text area. At the bottom are "Accept" and "Reset" buttons.

| # | Field | Op | Value |
|----|-------|----|-------|
| >> | | | |

Figure 53: Interface Filter to select the desired interface records by different fields

B. Selecting the Interfaces in the Interfaces View.

In the Main window, click the *Views Menu* ⇒ *Interfaces View* or press *ALT+V+I*.

In order to constrain (by Product Tree Element or by filtering) the number of Interfaces listed in the view, see the steps to be followed in section 4.2.

Select the desired Interface among the Interfaces listed in the table at the right side of the window by double-clicking with the left button of the mouse.

7.4 Modifying existing Interfaces

The Interface to be modified must be already selected, which will be done by following the steps described in section 7.3.

In the Interfaces Form, the following steps must be done in order to modify the selected Interface.

A. Modify the desired fields.

Make the desired changes in the Interface fields, taking into account all constraints identified in section 7.2, numbered item C).

All the fields in the Interfaces Form can be modified.

B. Save the modified record.

In the Interfaces Form, click the *Save button* to save the record,



If the record is not saved, the changes will not be applied.

C. Close the Interfaces form

In the Interfaces Form, click the *Exit button* to exit the form,



If the record has been saved, the Interfaces Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 54: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Interfaces Form.

7.5 Deleting an Interface

The Interface to be deleted must be already selected, which will be done by following the steps described in section 7.3.

In the Interfaces Form, the following steps must be done in order to delete the selected Interface.

A. Delete the record.

In the Interfaces Form, click the *Delete button* to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

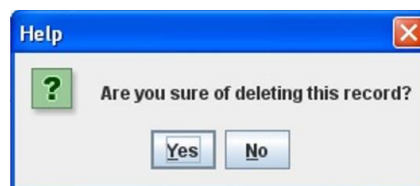


Figure 55: Warning Window to check if the user wants to delete the record

⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

7.6 Export Interfaces to XLS

In the Main window, click the *Tools Menu* ⇒ *Export Interfaces to XLS*.

A new window will appear where the user must, first, introduce the subsystem and the file name and path to save the xls file, then, click *Accept*.

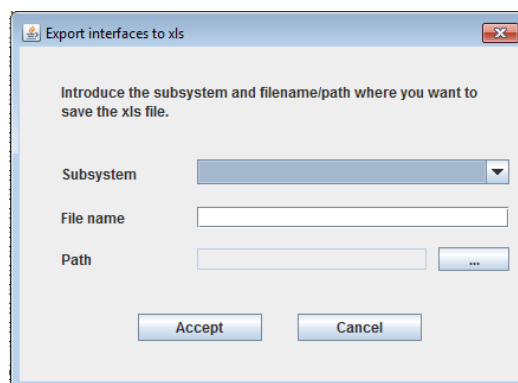


Figure 56: Window to insert the subsystem and filename/path to generate the xls file

A new window (it is necessary to have installed any xls viewer) will show a list of the interfaces of the subsystem and lower level elements that has been just introduced.



GECO User Manual 1.E



| A | B | C | D | E | F |
|----------------------|---------------------------|--------------|---------------|---------------------------|---|
| Code | Name | PT Element | Serial number | Comments | |
| 2 EF-SP-SH-100-0001 | Shutter Interface Flange | EF-SP-SH-100 | | | |
| 3 EF-SP-SH-100-0002 | Lower light-well A | EF-SP-SH-100 | | Lower light-well A | |
| 4 EF-SP-SH-100-0003 | Lower light-well B | EF-SP-SH-100 | | Lower light-well B | |
| 5 EF-SP-SH-100-0004 | Shutter plate | EF-SP-SH-100 | | Shutter plate | |
| 6 EF-SP-SH-100-0005 | Anchor | EF-SP-SH-100 | | Anchor | |
| 7 EF-SP-SH-100-0006 | Anchor clamp | EF-SP-SH-100 | | Anchor clamp | |
| 8 EF-SP-SH-100-0007 | Sliding piece | EF-SP-SH-100 | | Sliding piece | |
| 9 EF-SP-SH-100-0008 | Actuator | EF-SP-SH-100 | | Actuator | |
| 10 EF-SP-SH-100-0009 | Microswitch support | EF-SP-SH-100 | | Microswitch support | |
| 11 EF-SP-SH-100-0010 | Tensing piece | EF-SP-SH-100 | | Tensing piece | |
| 12 EF-SP-SH-100-0011 | Synchronous disc B | EF-SP-SH-100 | | Synchronous disc B | |
| 13 EF-SP-SH-100-0012 | Shutter flange | EF-SP-SH-100 | | Shutter flange | |
| 14 EF-SP-SH-100-0013 | Junction | EF-SP-SH-100 | | Junction | |
| 15 EF-SP-SH-100-0014 | Connector support | EF-SP-SH-100 | | Connector support | |
| 16 EF-SP-SH-100-0015 | End-of-travel block | EF-SP-SH-100 | | End-of-travel block | |
| 17 EF-SP-SH-100-0016 | End-of-travel block screw | EF-SP-SH-100 | | End-of-travel block screw | |
| 18 EF-SP-SH-100-0017 | Cover A | EF-SP-SH-100 | | Cover A | |
| 19 EF-SP-SH-100-0018 | Cover B | EF-SP-SH-100 | | Cover B | |
| 20 EF-SP-SH-100-0019 | Motor cover A | EF-SP-SH-100 | | Motor cover A | |
| 21 EF-SP-SH-100-0020 | Motor cover B | EF-SP-SH-100 | | Motor cover B | |
| 22 EF-SP-SH-100-0021 | Motor cover C | EF-SP-SH-100 | | Motor cover C | |
| 23 EF-SP-SH-100-0022 | Shutter cover A | EF-SP-SH-100 | | Shutter cover A | |
| 24 EF-SP-SH-100-0023 | Shutter cover B | EF-SP-SH-100 | | Shutter cover B | |
| 25 EF-SP-SH-100-0024 | Shutter cover C | EF-SP-SH-100 | | Shutter cover C | |
| 26 EF-SP-SH-100-0025 | Upper light-well | EF-SP-SH-100 | | Upper light-well | |
| 27 EF-SP-SH-100-0026 | Support studs | EF-SP-SH-100 | | Support studs | |
| 28 EF-SP-SH-100-0027 | Base plate | EF-SP-SH-100 | | Base plate | |
| 29 | | | | | |

Figure 57: After entering the subsystem, this window will show the result of the search of all the interfaces of this subsystem and lower level elements found in the database.



8. REQUIREMENTS

8.1 What is a Requirement?

A requirement is defined as the capacity or condition that a system, subsystem or component must fulfil to satisfy the specification or contract that has been formally imposed to this system, subsystem or component.

GECO is thought to manage all the requirements that must be produced during the design of a system, which comprise the Functional Requirements and the Technical Requirements.

- At the beginning of a design, the Functional Requirements are defined to describe the needs of the system, subsystem or component that is going to be designed.
- After a solution is found for the system, subsystem or component, the Technical Requirements are defined to describe this solution.

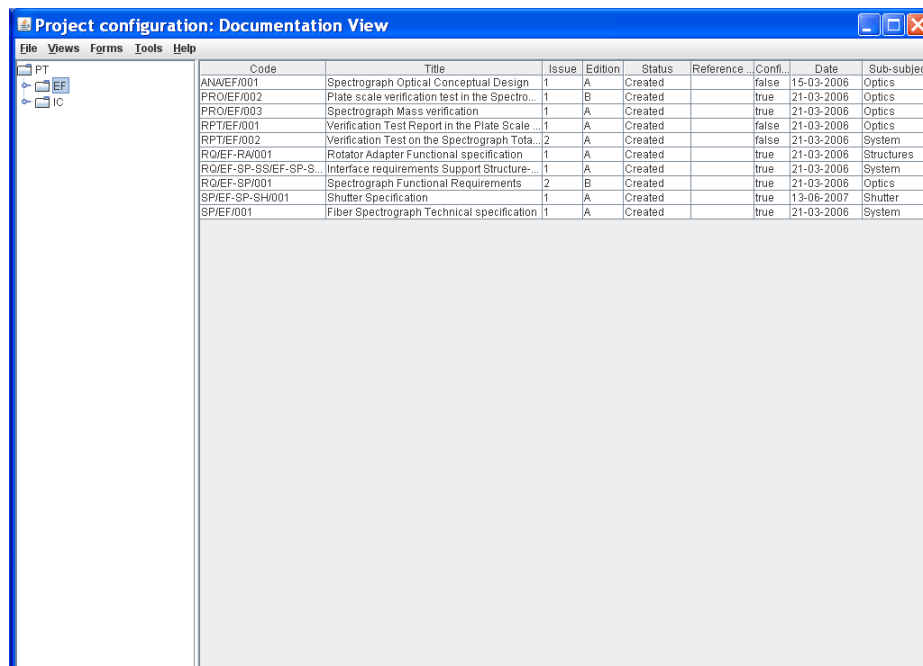
Elsewhere, Functional and Technical Requirements are named as Requirements and Specifications.

The requirements for a system, subsystem or component are normally grouped in a Requirement or Specification document. The user must define the requirements paying attention that the set of requirements is coherent, consistent and without conflicts among them.

Thinking in how to organize the requirements inside the documents, GECO has been implemented to allow the user organizing the requirements in two levels: sections and subsections. More information about the generation of requirement document can be found in section 10.6.

8.2 Creating a new Requirement

Starting at the Main Window of the application,



| Code | Title | Issue | Edition | Status | Reference | Conf. | Date | Sub-subject |
|------------------------|--|-------|---------|---------|-----------|-------|------------|-------------|
| ANA/EF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics |
| PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics |
| PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics |
| RPT/EF/001 | Verification Test Report in the Plate Scale | 1 | A | Created | | false | 21-03-2006 | Optics |
| RPT/EF/002 | Verification Test Report in the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System |
| RQ/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures |
| RQ/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure... | 1 | A | Created | | true | 21-03-2006 | System |
| RQ/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics |
| SPI/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter |
| SPI/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System |

Figure 58: Main window of the application

The following steps must be executed in order to create a new Requirement:

A. Open the Requirements Form.

In the Main window, the Requirements Form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Requirements Form* or press *ALT+O+R*.

The Requirements Form will be opened with all available records selected.

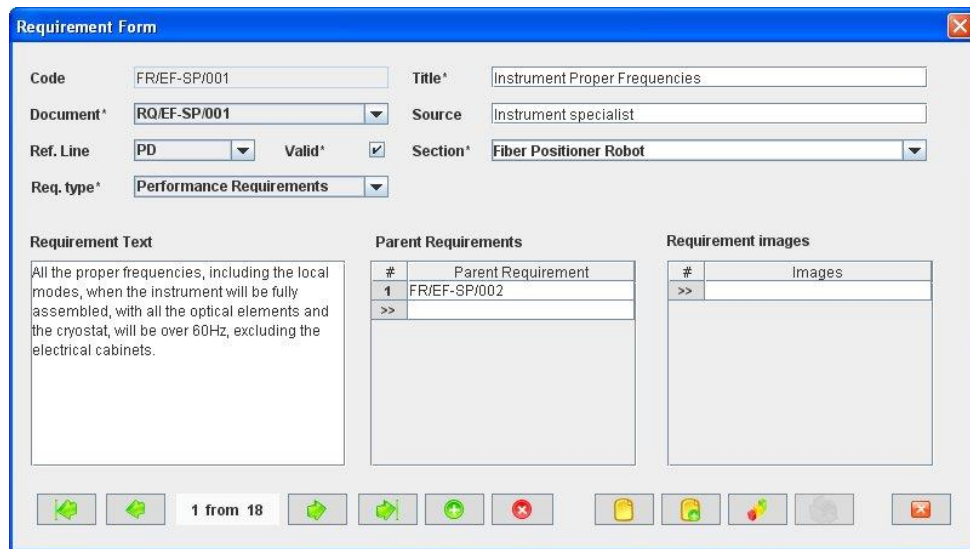


Figure 59: Requirements Form showing all the selected records

A.II. Selecting a Requirement in the Requirements View.

In the Main window, click the *Views Menu* \Rightarrow *Requirements View* or press *ALT+V+R*.

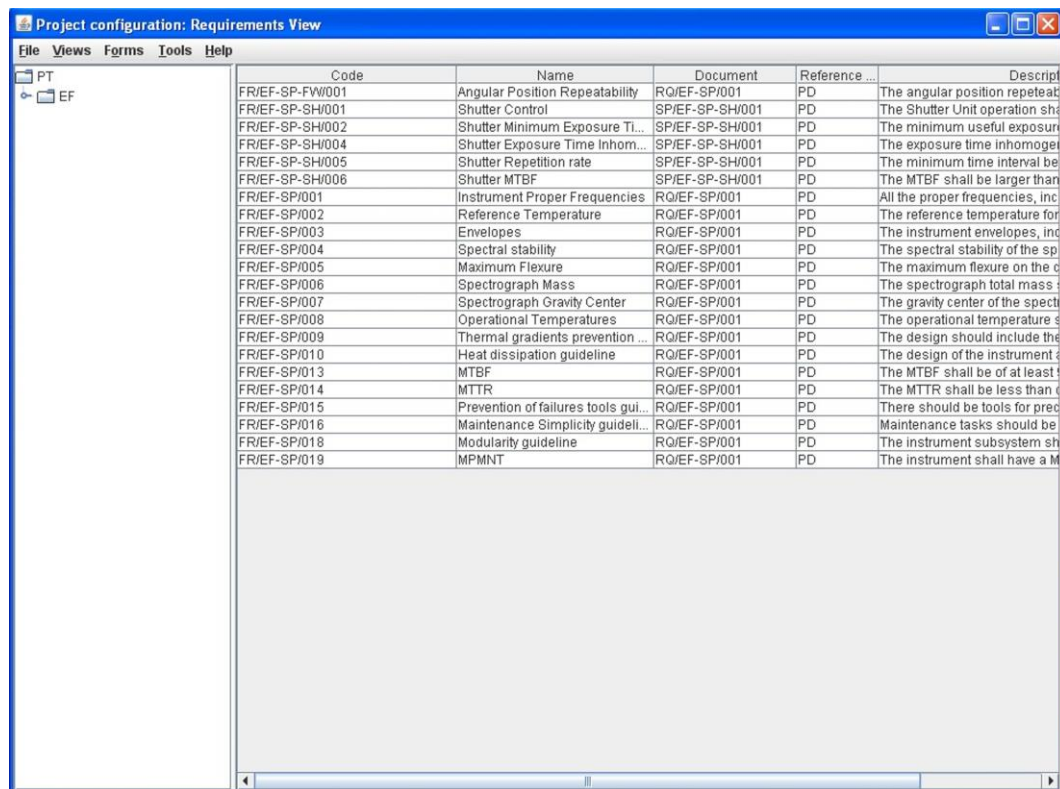


Figure 60: Requirements View (right panel) showing all the selected requirements associated to the selected PT element (left panel)

Select a Requirement among the Requirements listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Requirements Form will be opened only with the selected record available.

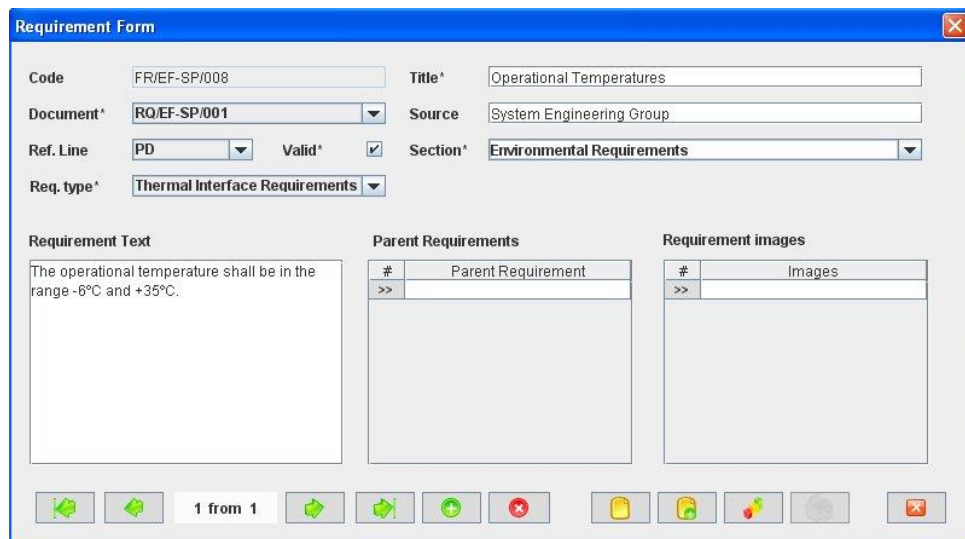


Figure 61: Requirements Form showing only the selected record

B. Add a new record.

In the Requirements form, new requirement can be created in two different ways:

B.I. Starting an empty requirement.

In the Requirements Form, click the *Add button* to add a new record,



A new window will appear,

- ⇒ select the requirement type in the *Requirement Type combo box*,
- ⇒ select the Product Tree or Interface code in the *PT Element or interface combo box*,
- ⇒ click *Accept*,

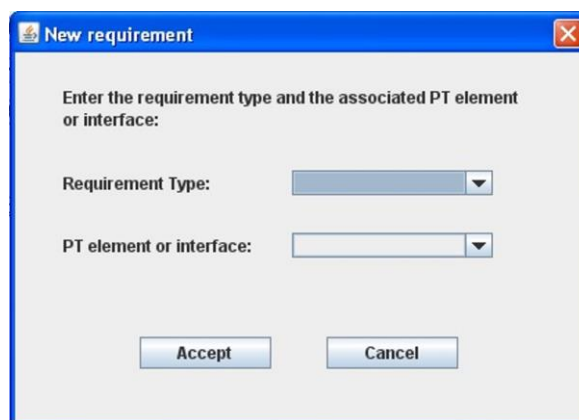


Figure 62: Requirements Form

The new Requirement **Code** will be automatically generated as the first one available for the Requirement type and Product Tree or Interface code selected.

All requirement Codes follow the same pattern as described below:

TT/PT/nnn

where,

TT: FR (Functional Requirement) or TR (Technical Requirement)

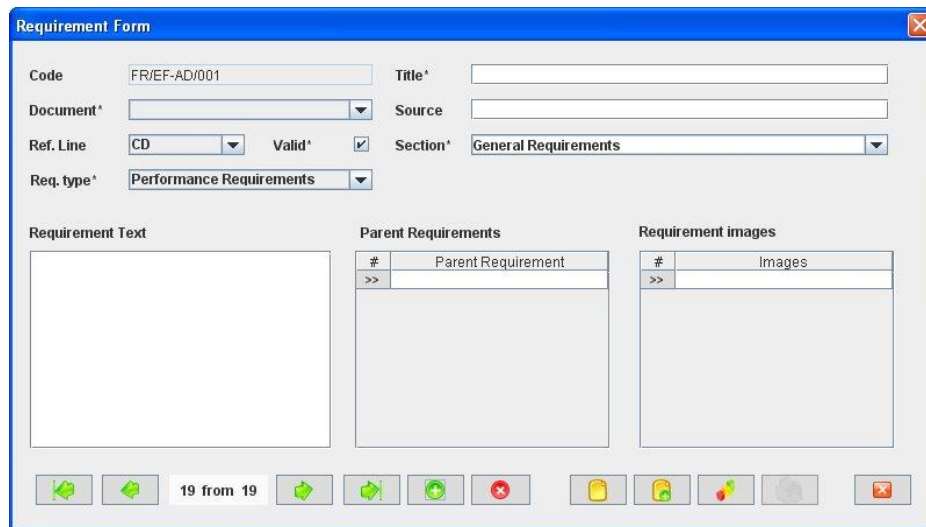
PT: Product Tree Element or Interface code

nnn: Sequence number that will be automatically generated by the application

The Requirement Code is unique for each requirement.

The user can change of this **Code** the Product Tree or Interface and/or the number.

The Requirement code convention is defined before starting to use GECO. More information about it can be found in section 16.



Requirement Form

Code: FR/EF-AD/001 Title:

Document: Source:

Ref. Line: CD Valid: ☒ Section: General Requirements

Req. type: Performance Requirements

Requirement Text:

Parent Requirements:

| # | Parent Requirement |
|----|--------------------|
| >> | |

Requirement images:

| # | Images |
|----|--------|
| >> | |

19 from 19

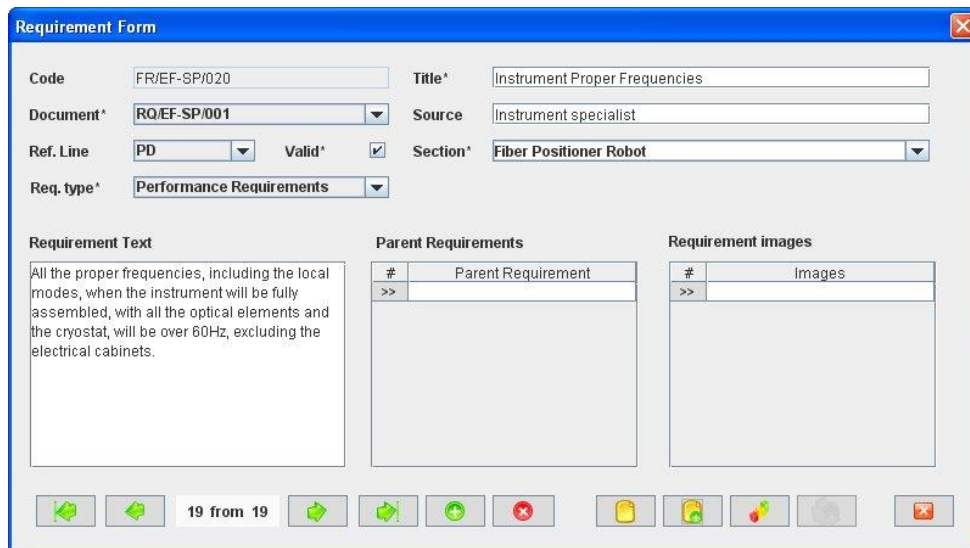
Figure 63: Requirements Form once the PT element or interface and the requirement type has been chosen as shown in Figure 62.

B.II. Cloning an already existing Requirement.

In the Requirements Form, click the *Copy* button to clone the requirement that is currently selected in the form,



The new Requirement **Code** will be automatically generated as the first one available for the same Requirement type and Product Tree or Interface code of the Requirement that has been cloned.



Requirement Form

Code: FR/EF-SP/020 Title: Instrument Proper Frequencies

Document: RQ/EF-SP/001 Source: Instrument specialist

Ref. Line: PD Valid: ☒ Section: Fiber Positioner Robot

Req. type: Performance Requirements

Requirement Text: All the proper frequencies, including the local modes, when the instrument will be fully assembled, with all the optical elements and the cryostat, will be over 60Hz, excluding the electrical cabinets.

Parent Requirements:

| # | Parent Requirement |
|----|--------------------|
| >> | |

Requirement images:

| # | Images |
|----|--------|
| >> | |

19 from 19

Figure 64: Requirements Form ready to introduce a new requirement by cloning an existing record

C. Fill in the new record.

In the Requirements Form, the mandatory fields that must be filled in are the following ones:



- **Code.** The requirement code is automatically generated by the application, but it can be modified by the user. If it is done, the application will check that there are not two requirements with the same code before the record is saved. This is a text field and the maximum length of this field is 60 characters.
- **Title.** Describe the objective of the requirement in the shortest and more concise way possible. This is a text field and the maximum length of this field is 150 characters.
- **Valid.** Indicate if the requirement is still applicable or not. This means that the requirement can be migrated to the corresponding document or not. By default, all requirements are applicable.
- **Reference line combo box.** Select the reference line of the requirement among the options offered in the Reference line combo box, which are the following ones:
 - CD (Conceptual Design)
 - PD (Preliminary Design)
 - DD (Detailed Design)
 - PRD (PRoDuction Phase)

By default, the reference line is “CD”.

- **Document combo box.** Select the code of the Requirement or Specification document that is going to include this requirement. In the combo box, all Requirement (REQ/...) and Specification (SPE/...) documents existing in the application will be accessible.
- **Type combo box.** Select the requirement type among the options offered in the Type combo box, which includes the following ones:
 - Functional Requirement
 - Performance Requirement
 - Physical Requirement
 - Environmental Requirement
 - Operation Requirement
 - Personnel Requirement
 - Production Requirement
 - Handling Requirement
 - RAMS Requirement
 - Configuration Requirement
 - Standardization Requirement
 - Design Requirement
 - Functional Interface Requirement



- Thermal Interface Requirement
- Electrical Interface Requirement
- Physical Interface Requirement
- Software Interface Requirement

The requirement type will be used later to define the subsection of the requirement whenever it is exported to a document (see section 10.6). By default, the requirement type is “*Functional requirement*”.

- **Section combo box.** Select or introduce the requirement section. It means, the user can select any of the options already included into the combo box (that offers all the sections previously defined for the document of the requirement) or introduce a new section (which will be offered for this document the next time that the section is going to be selected). By default, the section is “*General requirements*”. When a new section is introduced, it must be taken into account that the maximum length of this field is 80 characters.

If any of the mandatory fields are not filled, then the tool gives an alert and the record cannot be saved until all the mandatory fields have been introduced.

The rest of the fields that could be filled are the following ones:

- **Source.** Indicate the origin of the requirement, i.e., which person, organism or document is responsible for this requirement. It is important to mention that all requirements should be justified either by a **Source** or by one or several **Parent Requirements**, or by both. This is a text field and it does not have a maximum length limit.
- **Parent Requirements combo box.** Select as many Parent Requirements as necessary to indicate which already defined requirements are the origins of the current Requirement. It is important to mention that all requirements should be justified either by a **Source** or by one or several **Parent Requirements**. In the combo box, all requirements already existing in the application will be accessible.
- **Description.** Describe the content of the Requirement. It is convenient to follow the System Engineering practice rules as summarized in the following lines:
 - A requirement must be unique and not a combination of several requirements.
 - A requirement must not reference others requirements inside its text.
 - A requirement must be brief and easy to read and to understand. Explanations about the requirement could be in an analysis document which can be reference in the **Source** of the requirement.
 - A requirement must not be ambiguous. So, wording like “and/or”, “etc”, “maximize”, “minimize”, “as much as possible”, etc must be avoided.
 - Technical requirements must be reachable and verifiable.

This is a text field and it does not have a maximum length limit.

- **Images combo box.** Introduce as many images as needed to complete the content of the Requirement (i.e., all information that does not suit in a text paragraph, such

as equations, tables, figures, etc., must be converted into image format to be included in the requirement). When a new combo box row is selected, a new window will appear,

- ⇒ introduce the *Title* of the image,
- ⇒ select the image *Path*, by writing it directly in the text line or opening the File Manager when clicking in the *File Explorer Button*,



- ⇒ select if the image is going to be stored in the Database or only the reference to it by clicking in the *File by reference* box,
- ⇒ click *Accept*,

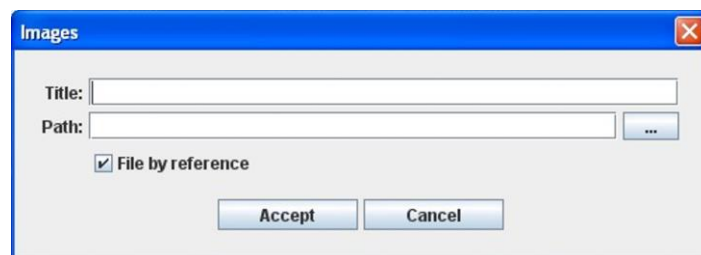


Figure 65: Window to include an image associated to a requirement

D. Save the new record.

In the Requirements Form, click the *Save button* to save the record,



If the current record is not saved, the new record will not be created.

E. Close the Requirements Form

In the Requirements Form, click the *Exit button* to exit the form,



If the record has been saved, the Requirements Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 66: Warning Window reporting that changes have not been saved.

- ⇒ Click *YES* to exit without saving
- ⇒ Click *NO* to come back to the Requirements Form.

8.3 Selecting a particular Requirement

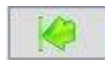
In the Main window, the form view of a particular Requirement can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Requirements Form* or press *ALT+O+R*.

In order to find a particular requirement, the following actions can be done:

\Rightarrow Use the arrows for moving among the Requirements currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

\Rightarrow Use the *Filter button* to filter/un-filter the set of Requirements currently selected in the form,



A new window will appear:

\Rightarrow Click *Data filter activated box* to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),

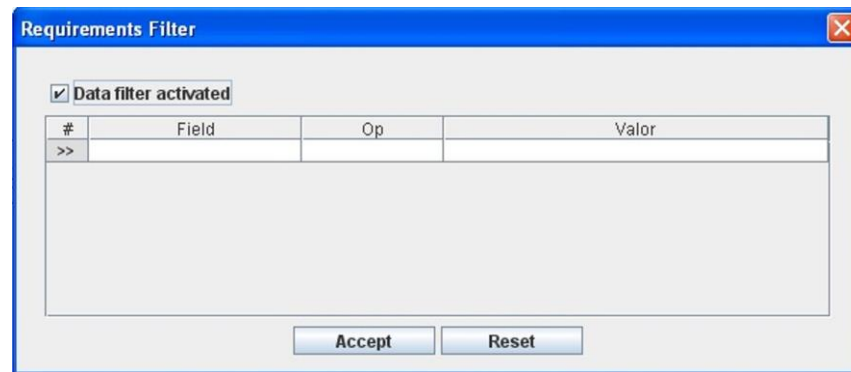
\Rightarrow select in the *Field combo box* the desired field to filter the data,

\Rightarrow select in the *Op combo box* how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

\Rightarrow write in the *Value Text Field* the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

\Rightarrow define as many filters as wanted (by adding new lines),

\Rightarrow click *Accept*,



The dialog box titled "Requirements Filter" has a checkbox labeled "Data filter activated" which is checked. Below it is a table with four columns: "#", "Field", "Op", and "Valor". The first row of the table contains the symbols ">>" in the "#" column and is otherwise empty. Below the table are two buttons: "Accept" and "Reset".

| # | Field | Op | Valor |
|----|-------|----|-------|
| >> | | | |

Figure 67: Requirements Filter to select the desired requirements by different fields

B. Selecting the Requirement in the Requirements View.

In the Main window, click the *Views Menu* \Rightarrow *Requirements View* or press *ALT+V+R*.

In order to constrain (by Product Tree Element or by filtering) the number of requirements listed in the view, see the steps to be followed in section 4.2.

Select the desired Requirement among the requirements listed in the table at the right side of the window by double-clicking with the left button of the mouse.

8.4 Modifying existing Requirements

The Requirement to be modified must be already selected, which will be done by following the steps described in section 8.3.

In the Requirements Form, the following steps must be done in order to modify the selected Requirement.

A. Modify the desired fields.

Make the desired changes in the Requirement fields, taking into account all constraints identified in section 8.2, numbered item C).

All the fields in the Requirements Form can be modified.

B. Save the modified record.

In the Requirements Form, click the *Save button* to save the record,



If the record is not saved, the changes will not be applied.

C. Close the Requirements Form

In the Requirements Form, click the *Exit button* to exit the form,



If the record has been saved, the Requirements Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 68: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Requirements Form.

8.5 Deleting a Requirement

The Requirement to be deleted must be already selected, which will be done by following the steps described in section 8.3.

In the Requirements Form, the following steps must be done in order to delete the selected Requirement.

A. Delete the record.

In the Requirements Form, click the *Delete* button to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

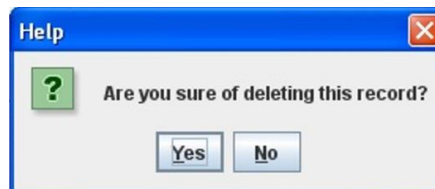


Figure 69: Warning Window to check if the user wants to delete the record

⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

8.6 Searching of Requirement's Parents

In the Main window, click the *Tools Menu* ⇒ *Consult requirement's parents* or press *ALT+T+P*.

A new window will appear where the user must, first, introduce the Requirement Code (i.e., the Code of the Requirement whose Parents are going to be searched) and, then, click *Accept*.



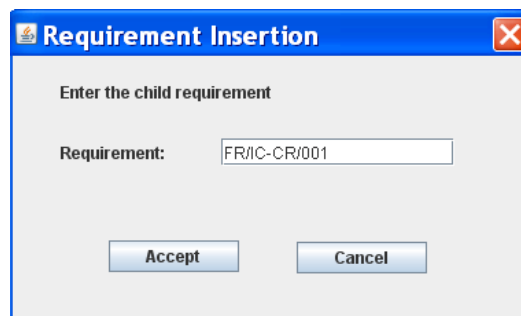
Requirement Insertion

Enter the child requirement

Requirement:

Accept Cancel

Figure 70: Window to insert the child requirement whose parent requirements have to be found



Requirement Insertion

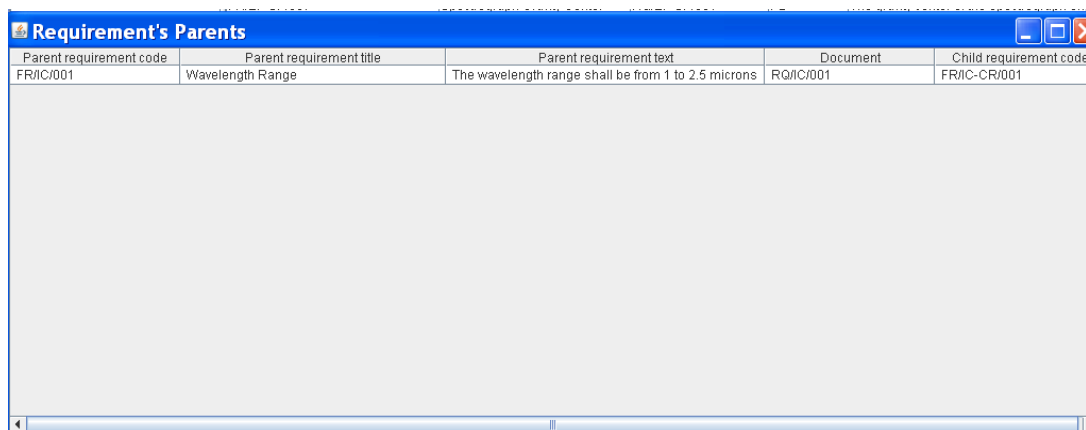
Enter the child requirement

Requirement:

Accept Cancel

Figure 71: The child requirement code has to be inserted in the field

A new window will show the Parents Requirements of the Requirement that has been just introduced.



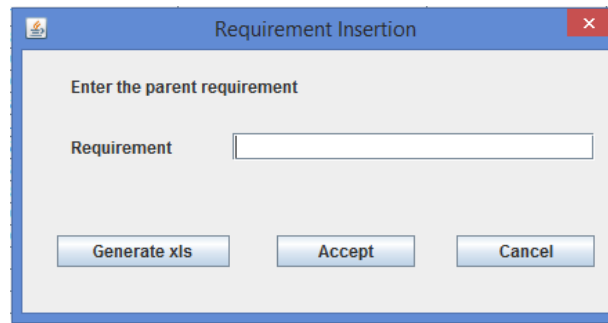
| Parent requirement code | Parent requirement title | Parent requirement text | Document | Child requirement code |
|-------------------------|--------------------------|---|-----------|------------------------|
| FR/IC/001 | Wavelength Range | The wavelength range shall be from 1 to 2.5 microns | RQ/IC/001 | FR/IC-CR/001 |

Figure 72: After entering the child requirement whose parents have to be found, this Window will show the result of the search with all the parent requirements found in the database.

8.7 Searching of Requirement's Children

In the Main window, click the *Tools Menu* \Rightarrow *Consult requirement's children* or press *ALT+T+C*.

A new window will appear where the user must, first, introduce the Requirement Code (i.e., the Code of the Requirement whose Childs are going to be search).



Requirement Insertion

Enter the parent requirement

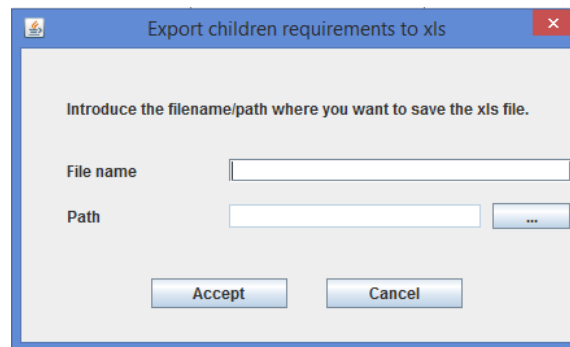
Requirement

Generate xls Accept Cancel

Figure 73: Window to insert the parent requirement whose child requirements have to be found

⇒ In the case the user wants the result in xls file, click *Generate xls* button.

A new window will appear where the user must introduce the file name and path to save the xls file, then, click *Accept*.



Export children requirements to xls

Introduce the filename/path where you want to save the xls file.

File name

Path ...

Accept Cancel

Figure 74: Window to insert the filename/path to generate the xls file.

And now, in the before window (see *Figure 74*) click *Accept*.

A new window (it is necessary to have installed any xls viewer) will show the Children Requirement of the Requirement that has been just introduced. Be aware that only the direct children of the parent requirement will be shown.

| | A | B | C | D | E |
|----|------------------------|-------------------------------|---|--------------|-------------------------|
| | Child requirement code | Child requirement title | Child requirement text | Document | Parent requirement code |
| 2 | FR/EF-SP/001 | Instrument Proper Frequencies | All the proper frequencies, including the local modes, when the instrument will be fully assembled, with all the optics | RO/EF-SP/002 | FR/EF-SP/002 |
| 3 | FR/EF-SP/020 | Spectrograph location | The spectrograph will be installed in the T Telescope | RO/EF-SP/001 | FR/EF-SP/007 |
| 4 | FR/EF/001 | Spectrograph | The color shall be white | RO/EF-SP/001 | FR/EF-SP/001 |
| 5 | FR/EF/001 | Spectrograph | The color shall be white | RO/EF-SP/001 | FR/EF-SP/006 |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |

Figure 75: After entering the parent requirement whose children have to be found, this window will show the result of the search with all the children requirements found in the database.

⇒ In other case, click *Accept* button.

A new window will show the Children Requirement of the Requirement that has been just introduced. Be aware that only the direct children of the parent requirement will be shown.



| Requirement's Children | | | | |
|------------------------|-------------------------|--|-----------|-------------------------|
| Child requirement code | Child requirement title | Child requirement text | Document | Parent requirement code |
| FR/IC-CR/001 | Operating Temperature | The operating temperature of the cryostat shall be | RQ/IC/001 | FR/IC/001 |
| | | | | |

Figure 76: After entering the parent requirement whose children have to be found, this window will show the result of the search with all the children requirements found in the database.

9. VERIFICATION MATRIX

9.1 What is the Verification Matrix?

The Verification Matrix collects all the information that is going to be generated during the process to verify the requirements, which includes information such as the planning of the verification tests and the result of these activities.

The Verification Matrix must include all Technical requirements. The Technical requirements describe the design solution of the system, which means that, as soon as the Technical Requirements has been approved, these requirements are going to be implemented and, therefore, they must be verified.

The Verification Matrix provides the status of the system. The user can easily check which requirements have been fulfilled and which ones could compromise the system objectives.

9.2 Exporting Requirements to the Verification Matrix

In the Main window, click the *Tools Menu* \Rightarrow *Exporting requirements to the Verification Matrix* or press *ALT+T+E*.

A new window will appear,

- \Rightarrow select in the *Subsystem* combo box the desired Product Tree element Code (i.e., the Code of the Product Tree element which Technical requirements are going to be exported to the Verification Matrix); or in the *Document* combo box the desired Document (i.e., the Code of the requirement document which Technical requirements are going to be exported to the Verification Matrix),
- \Rightarrow click *Accept*,

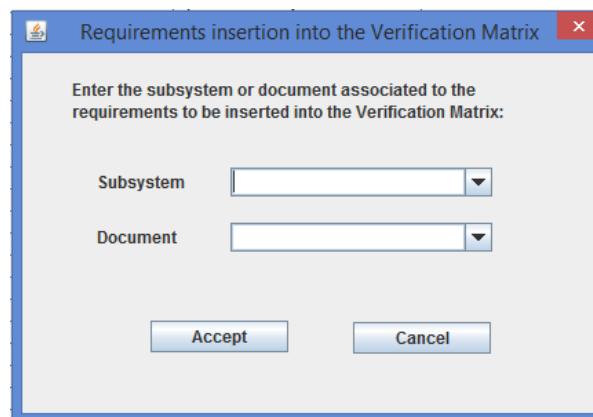


Figure 77: Window to select the subsystem or requirement document whose requirements have to be inserted into the Verification Matrix.

The user can check that the desired requirements have been correctly exported in the Verification Matrix View (see section 4.2.1). Take into account that the application is exporting all the Technical Requirement of the PT element selected and, also of the lower levels PT elements which are hanging of the one selected; or of the requirement document.

| Project configuration: Verification Matrix View | | | | | | |
|---|----------|-------|-------|------|--|--|
| File | Views | Forms | Tools | Help | | |
| PT | EF | | | | | |
| | EF-AD | | | | | |
| | EF-CF | | | | | |
| | EF-CM | | | | | |
| | EF-CS | | | | | |
| | EF-CU | | | | | |
| | EF-EC | | | | | |
| | EF-FS | | | | | |
| | EF-RA | | | | | |
| | EF-RB | | | | | |
| | EF-SP | | | | | |
| | EF-SP-CA | | | | | |
| | EF-SP-CB | | | | | |
| | EF-SP-CO | | | | | |
| | EF-SP-CR | | | | | |
| | EF-SP-FE | | | | | |
| | EF-SP-FL | | | | | |
| | EF-SP-FW | | | | | |
| | EF-SP-GT | | | | | |
| | EF-SP-SH | | | | | |
| | EF-SP-S8 | | | | | |
| | IC | | | | | |
| | IC-CR | | | | | |
| | IC-DE | | | | | |
| | IC-OP | | | | | |
| | IC-OP-FI | | | | | |

| Code | Name | Test Procedure | Test Responsible | Doer | Plar |
|--------------|-------------------------------------|----------------|------------------|------|------|
| FR/EF-SP/001 | Instrument Proper Frequencies | PRO/EF/002 | | | |
| FR/EF-SP/002 | Reference Temperature | | | | |
| FR/EF-SP/003 | Envelopes | | | | |
| FR/EF-SP/004 | Spectral stability | | | | |
| FR/EF-SP/005 | Maximum Flexure | | | | |
| FR/EF-SP/006 | Spectrograph Mass | | | | |
| FR/EF-SP/007 | Spectrograph Gravity Center | | | | |
| FR/EF-SP/008 | Operational Temperatures | | | | |
| FR/EF-SP/009 | Thermal gradients prevention ... | | | | |
| FR/EF-SP/010 | Heat dissipation guideline | | | | |
| FR/EF-SP/013 | MTBF | | | | |
| FR/EF-SP/014 | MTTR | | | | |
| FR/EF-SP/015 | Prevention of failures tools gui... | | | | |
| FR/EF-SP/016 | Maintenance Simplicity guideli... | | | | |
| FR/EF-SP/018 | Modularity guideline | | | | |
| FR/EF-SP/019 | MPMNT | | | | |
| FR/IC-CR/001 | Operating Temperature | | | | |
| FR/IC/001 | Wavelength Range | | | | |

Figure 78: Verification Matrix View

9.3 Selecting a particular Requirement in the Verification Matrix

The Requirement Code and Title are displayed in the Verification Matrix Form.

| | | | |
|----------------|-----------------------|---------------------|--------------------------|
| Code | FR/EF-SP/020 | Title | Spectrograph location |
| Responsible | Garcia Varqas, Marisa | Verification method | |
| Doer | Garcia Varqas, Marisa | Verification result | |
| Planned Date | 00-00-0000 | Verific. milestones | |
| Exec. Date | 00-00-0000 | Test report | |
| Test procedure | PRO/EF/002 | Non-conform. | |
| Test report | | Comments | |
| Non-conform. | | Conform | <input type="checkbox"/> |

1 from 1

Figure 79: Verification Matrix Form

In the Main window, the form view of a particular Requirement in the Verification Matrix can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Verification Matrix Form* or press *ALT+O+V*.

In order to find a particular requirement, the following actions can be done:

\Rightarrow Use the arrows for moving among the Requirements currently selected in the Verification Matrix Form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

\Rightarrow Use the *Filter button* to filter/un-filter the set of Requirements currently selected in the Verification Matrix Form,



A new window will appear:

\Rightarrow Click *Data filter activated box* to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),


\Rightarrow select in the *Field combo box* the desired field to filter the data,

\Rightarrow select in the *Op combo box* how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

\Rightarrow write in the *Value Text Field* the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

\Rightarrow define as many filters as wanted (by adding new lines),

\Rightarrow click *Accept*,



The dialog box titled "Requirements Filter" contains a checked checkbox "Data filter activated". Below it is a table with four columns: "#", "Field", "Op", and "Valor". The first row has a ">>" button in the "#" column and empty cells for the others. Below the table is a large text area for additional filters. At the bottom are "Accept" and "Reset" buttons.

| # | Field | Op | Valor |
|----|-------|----|-------|
| >> | | | |

Figure 80: Requirements Filter to select the desired requirements by different fields



B. Selecting the Requirement in the Verification Matrix View.

In the Main window, click the *Views Menu* \Rightarrow *Requirements View* or press *ALT+V+E*.

In order to constrain (by Product Tree Element or by filtering) the number of requirements listed in the view, see the steps to be followed in section 4.2.

Select the desired requirement among the requirements listed in the table at the right side of the window by double-clicking with the left button of the mouse.

9.4 Modifying existing information in the Verification Matrix

The Requirement in the Verification Matrix to be modified must be already selected, which will be done by following the steps described in section 9.3.

In the Verification Matrix Form, the following steps must be done in order to modify the selected Requirement.

A. Modify the desired fields.

Make the desired changes in the Requirement fields:

- **Responsible combo box.** Identify the person responsible to verify the requirements. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.
- **Doer combo box.** Identify the person responsible to execute the test procedure and verify the requirement. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.
- **Planned date.** Indicate the date that has been planned to verify the requirement. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Execution date.** Indicate the date when the requirement has been verified. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Test procedure combo box.** Identify the procedure (if any) that has been previously defined to be followed during the verification of the requirement. In the combo box, all Procedures (PRO/...) documents existing in the application will be accessible.
- **Test report combo box.** Identify the report (if any) that has been generated after the test that has been executed to verify the requirement. In the combo box, all Reports (RPT/...) documents existing in the application will be accessible.
- **Non-conformity combo box.** If the requirement has not been verified, a non-conformity could be raised to track and analyse the problem. In the combo box, all Non-conformities existing in the application will be accessible.
- **Conform.** Indicate if the requirement has been verified or not, which means that the requirement complies or not with the requirement text. By default, the requirements have not been verified yet and, therefore, they do not appear as "Conform".

- **Verification method.** Describe the method that is going to be used to verify the requirement. This is a text field and the maximum length of this field is 3000 characters.
- **Verification result.** Describe the result of the test that has been executed to verify the requirement. This is a text field and the maximum length of this field is 3000 characters.
- **Verification milestones.** Describe the milestones to verify the requirement. This is a text field and the maximum length of this field is 255 characters.
- **Comments box.** Describe any additional comments related to the verification test to be done or already executed. This is a text field and the maximum length of this field is 255 characters.

B. Save the modified record.

In the Verification Matrix Form, click the *Save button* to save the record,



If the record is not saved, the changes will not be applied.

C. Close the Verification Matrix Form

In the Verification Matrix Form, click the *Exit button* to exit the form,



If the record has been saved, the Verification Matrix Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 81: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Verification Matrix Form.

9.5 Deleting a Requirement in the Verification Matrix

The Requirement to be deleted must be already selected, which will be done by following the steps described in section 9.3.

In the Verification Matrix Form, the following steps must be done in order to delete the selected Requirement.

A. Delete the record.

In the Verification Matrix Form, click the *Delete button* to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

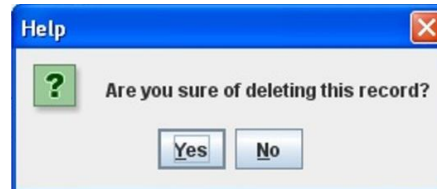


Figure 82: Warning Window to check if the user wants to delete the record

⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

9.6 Verification Matrix Summary View

In the Main window, click the *Tools Menu* ⇒ *Verification Matrix summary view* or press *ALT+T+V*.

A new window will appear where the user must, first, introduce the subsystem or the requirement document, and the file name and path to save the pdf file, then, click *Accept*.

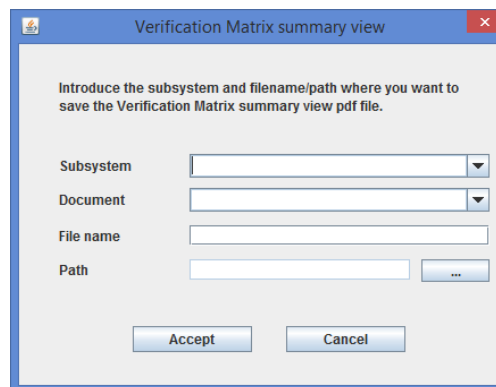


Figure 83: Window to insert the subsystem or requirement document, and filename/path to generate the pdf file

A new window (it is necessary to have installed any pdf viewer) will show a summary view of the verification matrix elements of the subsystem and lower level elements or of the requirement document that has been just introduced.

| Requirement code | Requirement title | Verification milestones | Verification method | Verification results |
|------------------|---|-------------------------|---------------------|----------------------|
| FR-EE-S1/001 | Precisión de anclaje del adaptador al rotador Nasmyth | | | |
| FR-EE-S1/002 | Masa del adaptador | | | |
| FR-EE-S1/003 | Posición de la estructura con respecto al adaptador | | | |
| TR-EE-S1/001 | Masa y Volumen del espectrógrafo de ejemplo | SA | Test | |

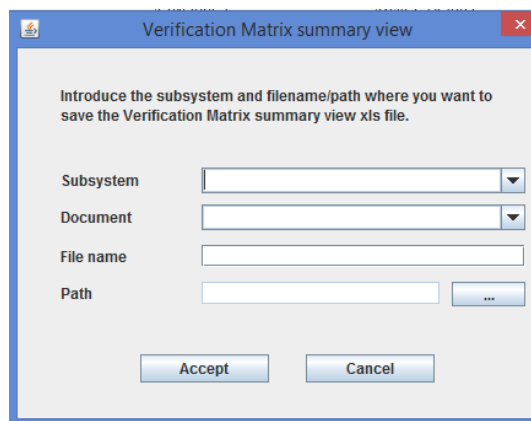
Page 1

Figure 84: After entering the subsystem, this window will show the result of the search with all the verification matrix elements of this subsystem and lower level elements or of requirement document found in the database.

9.7 Export Verification Matrix to XLS

In the Main window, click the *Tools Menu* \Rightarrow *Export Verification Matrix to XLS*.

A new window will appear where the user must, first, introduce the subsystem or requirement document, and the file name and path to save the xls file, then, click *Accept*.



Verification Matrix summary view

Introduce the subsystem and filename/path where you want to save the Verification Matrix summary view xls file.

Subsystem:

Document:

File name:

Path: ...

Accept Cancel

Figure 85: Window to insert the subsystem or requirement document, and filename/path to generate the xls file

A new window (it is necessary to have installed any xls viewer) will show a list of the verification matrix elements of the subsystem and lower level elements or of the requirement document that has been just introduced.



| A | | B | C | D | E |
|------------------|--------------|---|-------------------------|---------------------|----------------------|
| Requirement code | | Requirement title | Verification milestones | Verification method | Verification results |
| 2 | FR/EE-S1/001 | Precisión de anclaje del adaptador al rotador Nasmyth | | | |
| 3 | FR/EE-S1/002 | Masa del adaptador | | | |
| 4 | FR/EE-S1/003 | Posición de la estructura con respecto al adaptador | | | |
| 5 | TR/EE-S1/001 | Masa y Volumen del espectrógrafo de ejemplo | SA | Test | |
| 6 | TR/EE/001 | Masa y Volumen del espectrógrafo de ejemplo | | | |
| 7 | TR/EE/002 | Rango de longitudes de onda del espectrógrafo de ejemplo | | | |
| 8 | TR/EE/003 | Repetibilidad del alineamiento entre el espectro y una fila | | | |
| 9 | TR/EE/004 | Repetibilidad de la posición angular de la rueda de filtros | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |

Figure 86: After entering the subsystem, this window will show the result of the search of all the verification matrix elements of this subsystem and lower level elements or of this requirement document found in the database.

10. DOCUMENTS

10.1 What is a Document?

A Document is commonly defined as a writing that contains information.

In any organization, there are a lot of different documents that must be generated and kept. Not only technical documents such as Requirement or Specification documents, Drawings, Reports, Analysis, Procedures, etc but, also, formal documents such as Contracts, Intentions to Tender, Statement of Work documents, etc.

GECO provides the means to organize, to classify and to access all these documents¹.

10.2 Creating a new Document

Starting at the Main Window of the application,

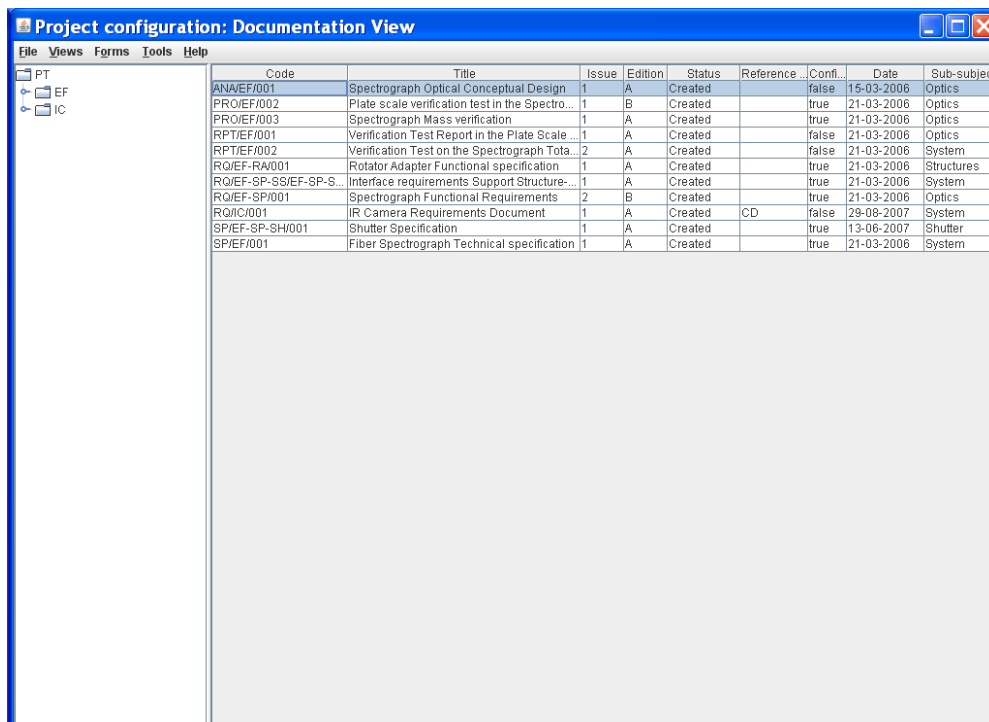


Figure 87: Main window of the application

The following steps must be executed in order to create a new Document:

A. Open the Documents Form.

In the Main window, the Documents Form can be opened in two different ways:

¹ It is important to mention that the documents themselves are not stored in the Database, only the information about them, including the link. So, the Database back-ups do not manage the documents back-ups, which must be done independently.

Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Documents Form* or press *ALT+O+D*.

The Documents Form will be opened with all available records selected.

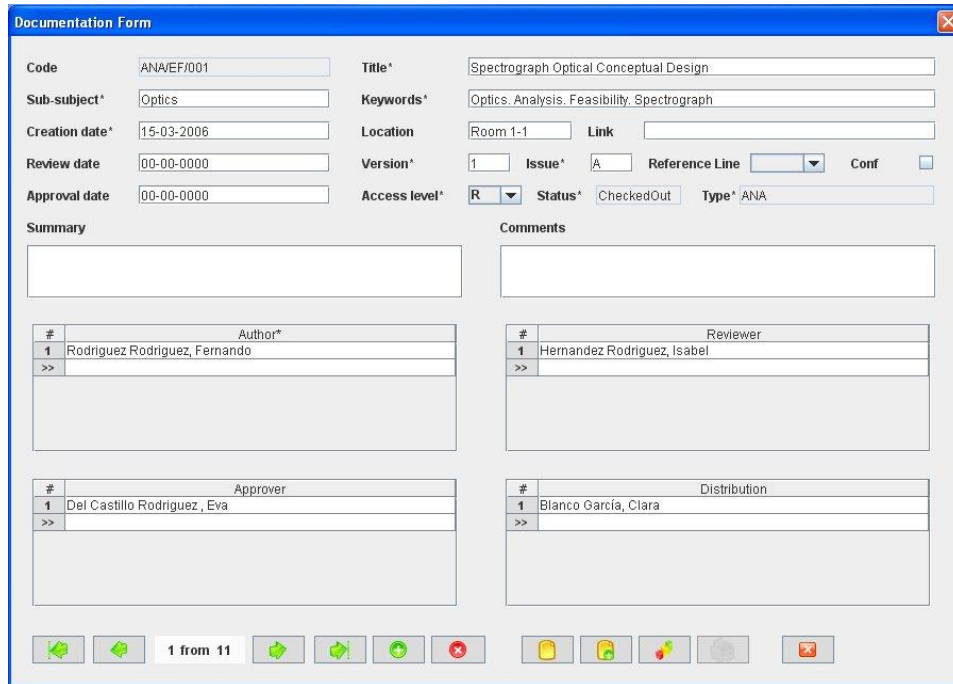
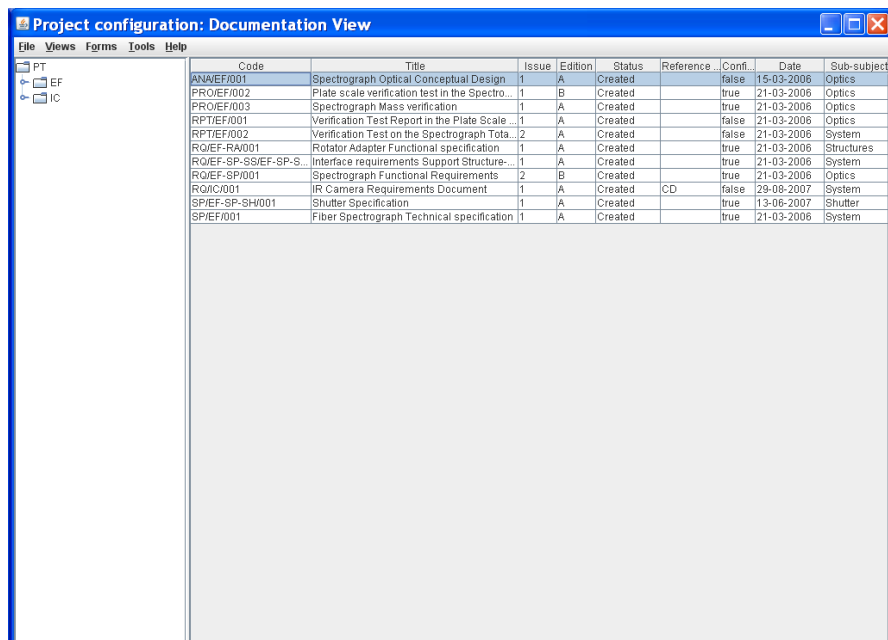


Figure 88: Documents Form showing all the selected records

A.I. Selecting a Document in the Documents View.

In the Main window, click the *Views Menu* \Rightarrow *Documents View* or press *ALT+V+D*.

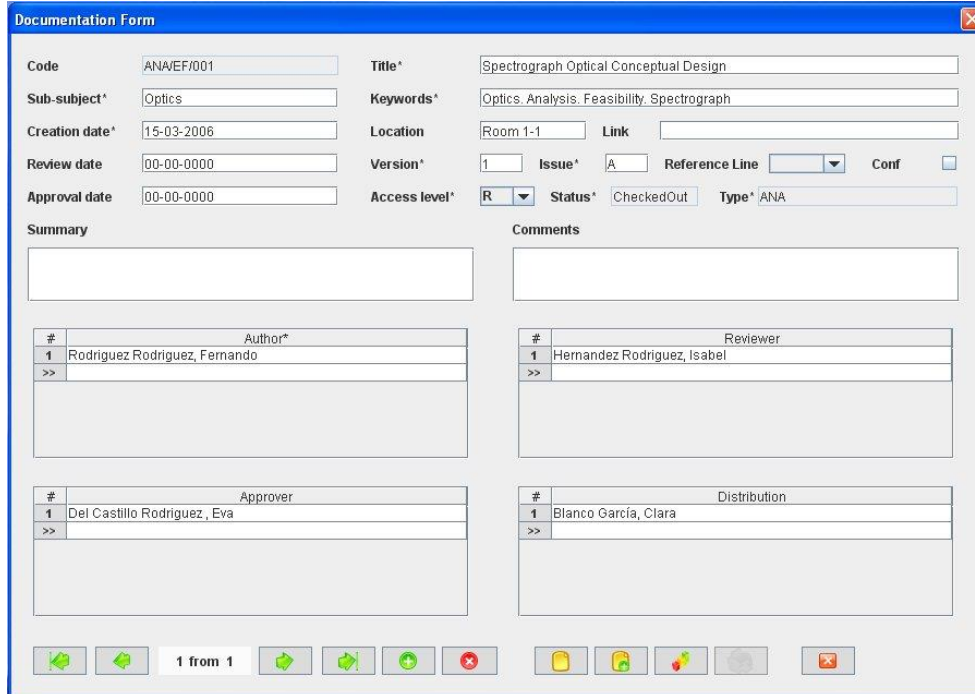


| Code | Title | Issue | Edition | Status | Reference | Conf. | Date | Sub-subject |
|------------------------|---|-------|---------|---------|-----------|-------|------------|-------------|
| ANA/EF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics |
| PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics |
| PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics |
| RPT/EF/001 | Verification Test Report in the Plate Scale ... | 1 | A | Created | | false | 21-03-2006 | Optics |
| RPT/EF/002 | Verification Test on the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System |
| RO/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures |
| RO/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure... | 1 | A | Created | | true | 21-03-2006 | System |
| RO/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics |
| RO/C/001 | IR Camera Requirements Document | 1 | A | Created | CD | false | 29-08-2007 | System |
| SP/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter |
| SP/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System |

Figure 89: Documents View (right panel) showing all the selected document associated to the selected PT element (left panel)

Select a Document among the Documents listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Documents Form will be opened only with the selected record available.



The screenshot shows the 'Documentation Form' window. It contains several input fields for document metadata: Code (ANAVEF001), Title (Spectrograph Optical Conceptual Design), Sub-subject (Optics), Keywords (Optics, Analysis, Feasibility, Spectrograph), Creation date (15-03-2006), Location (Room 1-1), Link, Review date (00-00-0000), Version (1), Issue (A), Reference Line, Conf, Approval date (00-00-0000), Access level (R), Status (CheckedOut), and Type (ANA). Below these fields are four tables: Summary, Comments, Author (Rodríguez Rodríguez, Fernando), Reviewer (Hernández Rodríguez, Isabel), Approver (Del Castillo Rodríguez, Eva), and Distribution (Blanco García, Clara). The bottom of the window features a toolbar with various icons and a status bar indicating '1 from 1'.

Figure 90: Documents Form showing only the selected record

B. Add a new record.

In the Documents Form, new Documents can be created in two different ways:

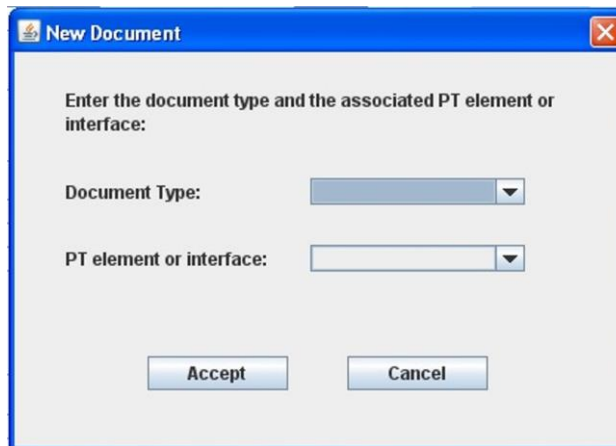
B.I. Starting an empty Document.

In the Documents Form, click the *Add* button to add a new record,



A new window will appear,

- ⇒ select the document type in the *Document Type* combo box,
- ⇒ select the Product Tree or Interface code in the *PT Element or interface* combo box,
- ⇒ click *Accept*,



The image shows a 'New Document' dialog box with a blue title bar. Inside, it says 'Enter the document type and the associated PT element or interface:'. There are two dropdown menus: 'Document Type:' and 'PT element or interface:'. At the bottom, there are 'Accept' and 'Cancel' buttons.

Figure 91: Documents Form

The new Document **Code** will be automatically generated as the first one available for the Document type and Product Tree or Interface code selected.

All Document Codes follow the same pattern as described below:

TT/PT/nnn

where,

TT: Document type, which include the following options:

- Analysis (ANA)
- Drawing (DR)
- Interface (INT)
- Minutes of Meeting (MOM)
- Procedure (PRO)
- Report (RPT)
- Requirement document (RQ)
- Specification document (SP)
- Technical note (TEN)

PT: Product Tree Element or Interface code

nnn: Sequence number that will be automatically generated by the application

The Document Code is unique for each document.

The Document Code convention is defined before starting to use GECO. More information about it can be found in section 16.

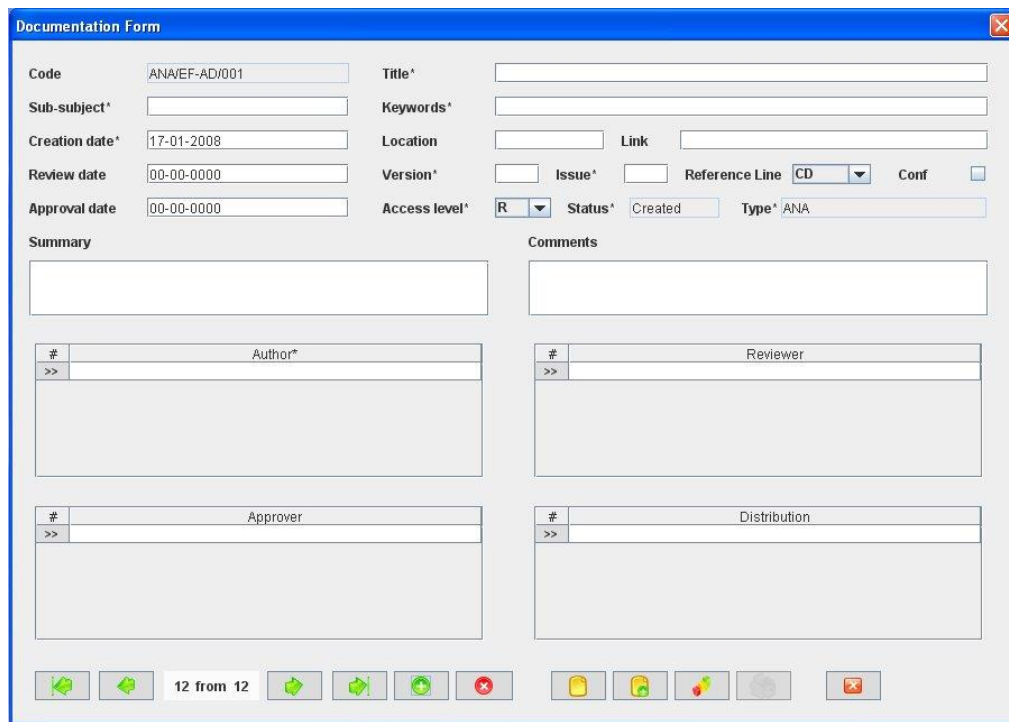


Figure 92: Documents Form once the PT element or interface and the document type has been chosen as shown in Figure 91

B.II. Cloning an already existing Document.

In the Documents Form, click the *Copy button* to clone the document that is currently selected in the form,



The new Document **Code** will be automatically generated as the first one available for the same Document type and Product Tree or Interface code of the Document that has been cloned.

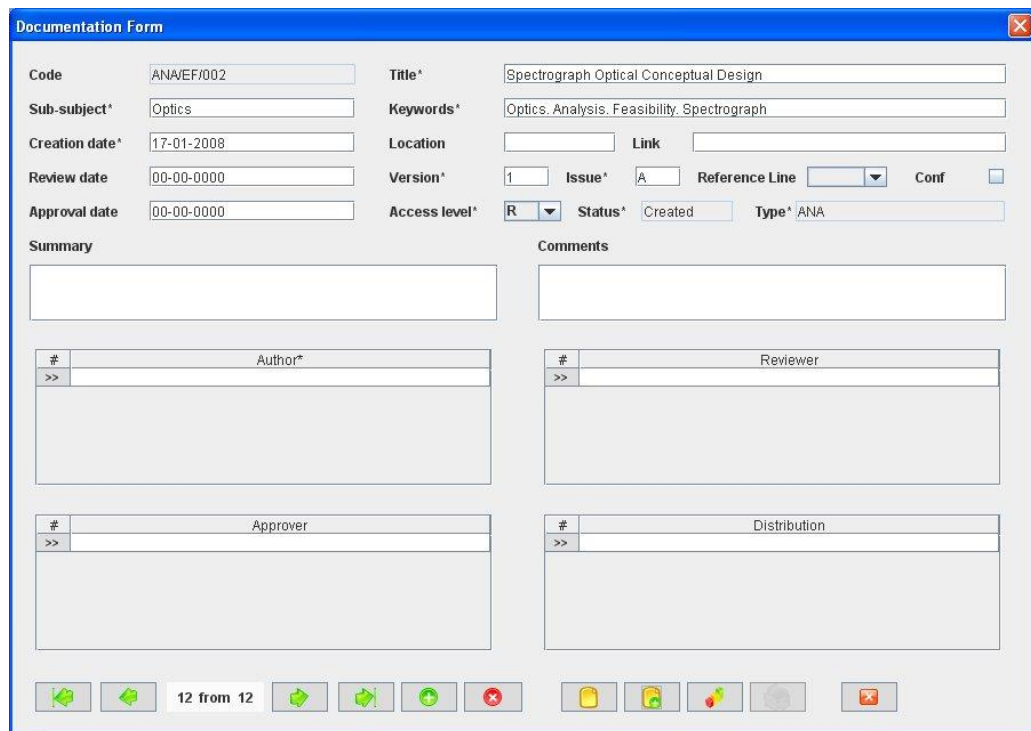


Figure 93: Documents Form ready to introduce a new document by cloning an existing record

C. Fill in the new record.

In the Document Form, the mandatory fields that must be filled in are the following ones:

- **Code.** The Document code is automatically generated by the application, but it can be modified by the user. If it is done, the application will check that there are not two documents with the same code before the record is saved. This is a text field and the maximum length of this field is 60 characters.
- **Title.** The title of the document should describe in the shortest and more concise way possible the objective of the document. This is a text field and the maximum length of this field is 255 characters.
- **Sub-subject.** Indicate which subsystem (or group inside the organization) is in charge of creating and maintaining the document. This is a text field and the maximum length of this field is 20 characters.
- **Keywords.** Include the main keywords of the document (i.e., the words that best describe the content of the documents). This field could help whenever the user is looking for this document or looking for documents applicable to a certain concept. This is a text field and the maximum length of this field is 250 characters.
- **Creation date.** Indicate the date when the document has been initially created. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Version.** Indicate the version number of the document. This is a text field and the maximum length of this field is 5 characters.
- **Issue.** Indicate the issue number of the document. This is a text field and the maximum length of this field is 5 characters.



- **Access level combo box.** Select the access level policy associated with the document among the options offered in the access level combo box, which includes the following ones:
 - *R* (Restricted access)
 - *P* (Public access)
 - *L* (Limited access)

By default, the access level is defined as “*R*”.

- **Status.** Indicate the current situation of the document. This is a text field and the maximum length of this field is 20 characters. By default, the status is always “*Created*”. This field has been introduced to make GECO compatible with other tools of the Fractal Projects Suite, in particular with the Documentation Management Tool, DOCMA.
- **Type combo box.** This field has been defined at the document creation and cannot be modified.
- **Author.** Identify the authors of the document (as many persons as wanted can be selected). In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.

The rest of the fields that could be filled are the following ones:

- **Review date.** Indicate the date when the revision of the document has been finished. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Reference line combo box.** Select the reference line of the document among the options offered in the Reference line combo box, which includes the following ones:
 - *CD* (Conceptual Design line)
 - *PD* (Preliminary Design line)
 - *DD* (Detailed Design line)
 - *PDR* (Product line)

By default, the privacy is defined as “*CD*”.

- **Conf.** Indicate if the document is a configuration document or not. By default, all documents are not “configuration document” (i.e., the tick is not marked).
- **Approval date.** Indicate the date when the document has been finally approved. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Summary.** Describe briefly the content of the document. This is a text field and the maximum length of this field is 300 characters.
- **Comments.** Introduce any additional comment related to the document. This is a text field and the maximum length of this field is 60 characters.

- **Location.** Indicate where the document is physically stored. This is a text field and the maximum length of this field is 100 characters.
- **Link.** It is possible to create a link to the directory where the electronic copy of the document is stored. This is a text field and the maximum length of this field is 255 characters.
- **Reviewer.** Identify the reviewers of the document (as many persons as wanted can be selected). In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.
- **Approver.** Identify the approvers of the document (as many persons as wanted can be selected). In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.
- **Distribution.** Identify to which persons the document must be distributed (as many persons as wanted can be selected). In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.
- **Notification.** Identify which persons must be notified of the creation or new versions of the document (as many persons as wanted can be selected). In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) will be accessible.

D. Save the new record.

In the Documents Form, click the *Save button* to save the record,



If the current record is not saved, the new record will not be created.

E. Close the Requirements Form

In the Documents Form, click the *Exit button* to exit the form,



If the record has been saved, the Documents Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

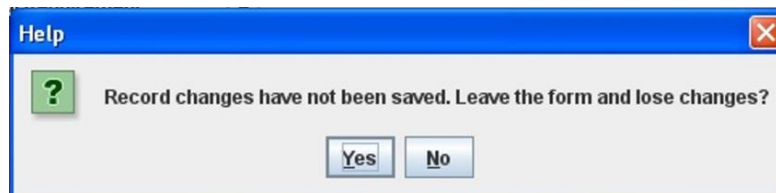


Figure 94: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Documents Form.

10.3 Selecting a particular Document

In the Main window, the form view of a particular Document can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Documents Form* or press *ALT+O+D*.

In order to find a particular document, the following actions can be done:

\Rightarrow Use the arrows for moving among the documents currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

\Rightarrow Use the *Filter button* to filter/un-filter the set of documents currently selected in the form,



A new window will appear:

\Rightarrow Click *Data filter activated box* to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),

\Rightarrow select in the *Field combo box* the desired field to filter the data,

\Rightarrow select in the *Op combo box* how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

\Rightarrow write in the *Value Text Field* the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

\Rightarrow define as many filters as wanted (by adding new lines),

\Rightarrow click *Accept*,

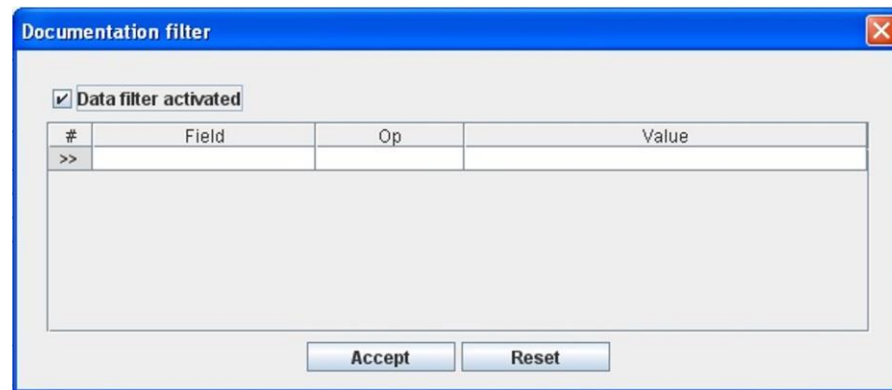


Figure 95: Documents Filter to select the desired documents by different fields

B. Selecting the Document in the Documents View.

In the Main window, click the *Views Menu* \Rightarrow *Documents View* or press *ALT+V+D*.

In order to constrain (by Product Tree Element or by filtering) the number of documents listed in the view, see the steps to be followed in section 4.2.

Select the desired document among the documents listed in the table at the right side of the window by double-clicking with the left button of the mouse.

10.4 Modifying existing Document

The document to be modified must be already selected, which will be done by following the steps described in section 10.3.

In the Documents Form, the following steps must be done in order to modify the selected Document.

A. Modify the desired fields.

Make the desired changes in the Document fields, taking into account all constraints identified in section 10.2, numbered item C).

All the fields in the Documents Form can be modified.

B. Save the modified record.

In the Documents Form, click the *Save button* to save the record,



If the record is not saved, the changes will not be applied.

C. Close the Documents Form

In the Documents Form, click the *Exit button* to exit the form,



If the record has been saved, the Documents Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

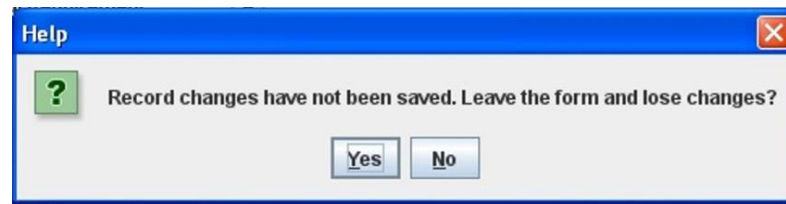


Figure 96: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Documents Form.

10.5 Deleting a Document

The Document to be deleted must be already selected, which will be done by following the steps described in section 10.3.

In the Documents Form, the following steps must be done in order to delete the selected Document.

B. Delete the record.

In the Documents Form, click the *Delete button* to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

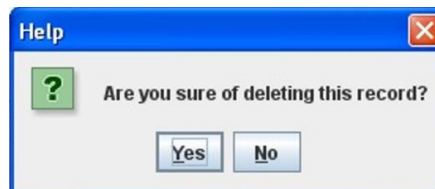


Figure 97: Warning Window to check if the user wants to delete the record

⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

10.6 Exporting Requirements into a Document

All requirements have as a mandatory field the Requirements or Specifications Document where they are going to be grouped. Therefore, the Requirement or Specification Document must have been already created even before entering a requirement and, of course, before trying to export the requirements to the Document.

Whenever the user wants to export the requirements to the Document, the following steps must be done.

A. Select a Document.

In the Main window, click the *Views Menu* ⇒ *Documents View* or press *ALT+V+D*.

Select the Document which requirements are going to be exported (i.e., all Requirements that has this particular document in their *Document* field will be selected).

Once the Document is selected, click the *Tools Menu* \Rightarrow *Exporting Requirements to XML* or press *ALT+T+E*.

If the Document selected is a Requirement or Specification Document, the following window will appear:

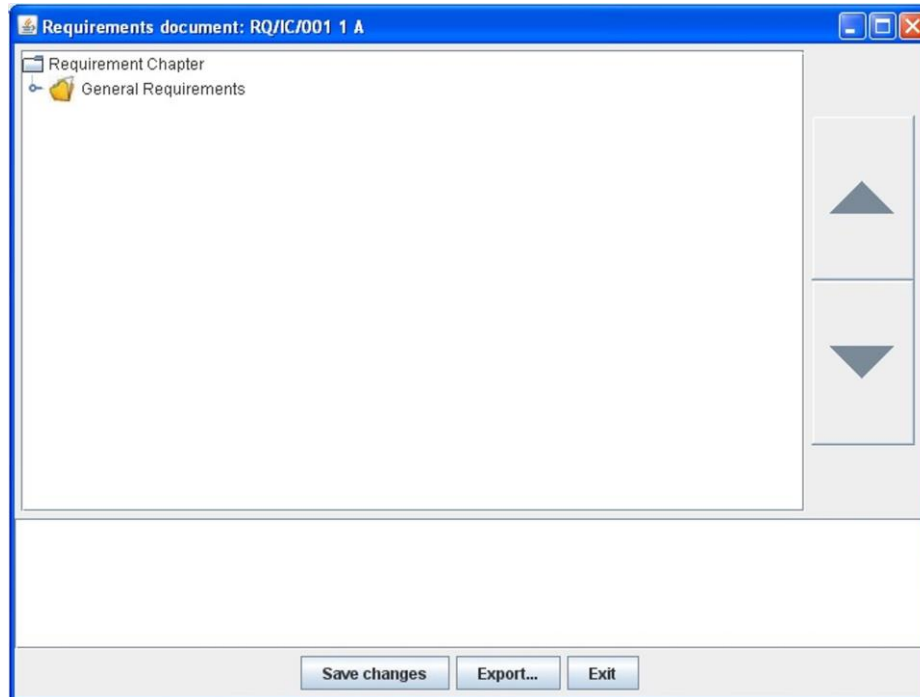


Figure 98: *Exporting Requirements Window*

If the Document is not a Requirement or Specification Document, an error messages will indicate it to the user.

B. Organize the Requirements.

The sections, subsections and requirements order in the document will be as shown in the window tree (click the small blue key to open the section and subsections). The order can be changed by doing the actions indicated in the following steps:

- \Rightarrow Select the section, subsection or requirement which relative position in the Tree is going to be changed by clicking with the left button of the mouse.
- \Rightarrow Use the corresponding arrows (in the right side of the window) to move the selected item up and down as shown in the figure.

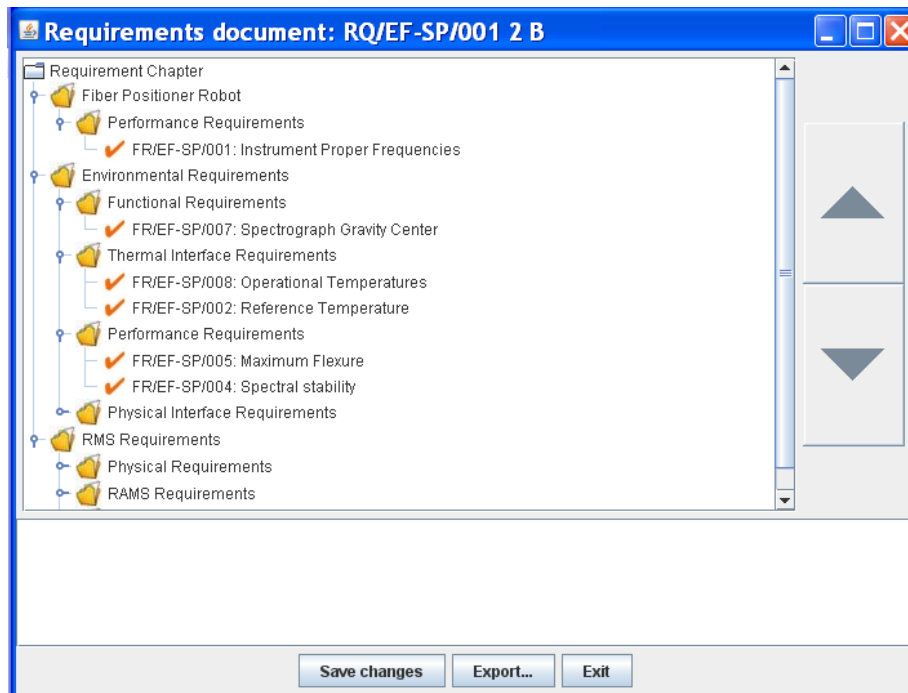


Figure 99: Sections and Subsections are opened in the Exporting Requirements Window, the order of the sections, subsections and requirements can be modified

⇒ Repeat the previous steps as many times as needed in order to organize the sections, subsections and requirements order.

C. Save the changes done in the requirements organization.

In order to save the changes done in the section, subsections and requirements order, click the *Save button*.



D. Export the Requirements to the document.

In order to export the requirements to the document, click the *Export button*.



The following window will appear:

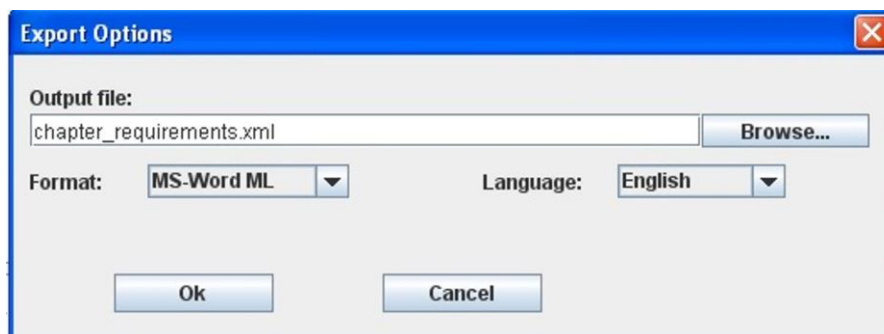


Figure 100: Generating the XML Files Window

- ⇒ Indicate the name of the document in the *Output file* field.
- ⇒ Select the Folder to save the document using the *Browse ...* button.
- ⇒ Select the Format of the output file in the *Format* combo box, which offers two options:
 - MS-Word ML: The output file is an MS-Word XML file, which can be inserted in the Requirements section of the corresponding Requirement or Specification Document.
 - Req ML: The output file is an XML file, which follows a pattern as shown in the example below:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<RequirementSet>
  <Section Name="General Requirements">
    <Subsection Name="Performance Requirement">
      <Requirement Code="FR/IC/001" Title="Wavelength
Range">
        <Source>Instrumentation Group</Source>
        <Description>The wavelength range shall
be from 1 to 2.5 microns</Description>
      </Requirement>
    </Subsection>
    <Subsection Name="Environmental Requirement">
      <Requirement Code="FR/IC-CR/001"
Title="Operating Temperature">
        <ParentReqSet>
          <PR Code="FR/IC/001"/>
        </ParentReqSet>
        <Source>Instrumentation Group</Source>
        <Description>The operating temperature of
the cryostat shall be 77K</Description>
      </Requirement>
    </Subsection>
  </Section>
</RequirementSet>
```

- ⇒ Select the language of the output file in *Language* combo box. The options are: English and Spanish. The language is only applicable if the file to be created is an MS-Word ML file. According to the language selected, the labels Source and Parent requirements shall be included in the xml file in English or Spanish.
- ⇒ Select *Accept*.

E. Close the Exporting Requirements to XML window.

In order to exit of the Exporting Requirement to XML window, click the *Exit* button.



If the changes have not been saved, the changes will not be applied.

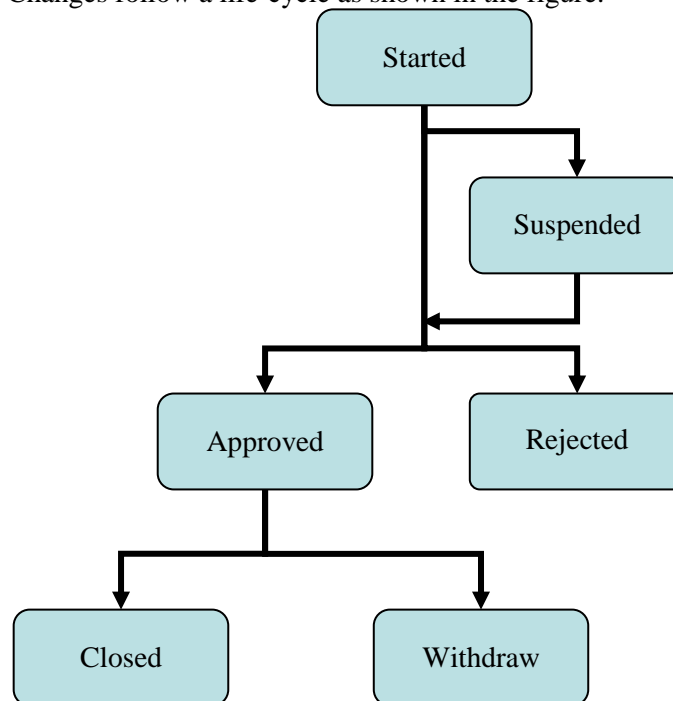
11. CONFIGURATION CHANGES

11.1 What is a Configuration Change?

A Configuration Change is a formal request to modify the current configuration of the system. The current configuration of the system, which can also be referred as the configuration baseline, is defined by the approved status of the design of the system at a particular project milestone.

The Product Tree elements, Interfaces, Requirements and Drawings are all part of the system configuration. So, any change to these elements, once they have been approved whenever a particular project milestone (i.e., Conceptual Design Review, Preliminary Design Review ...) has been successfully reached, cannot be done before a Configuration Change is requested and approved.

The Configuration Changes follow a life-cycle as shown in the figure:



This life-cycle can be briefly summarized in the following steps:

- In the first place, the Configuration Change must be introduced in the application. All relevant information related to this particular Configuration Change must be identified to allow the CRB (Configuration change Review Board) evaluates correctly the implications of the change. At that point, the Configuration Change status is “*Started*”.
- In the CRB meeting, the Configuration Change is analysed and the Configuration Change state can be changed to “*Approved*” or “*Rejected*” depending of the board decision. Alternatively, if any lack of information is found, the Configuration Change Board can decide to classify the change as “*Suspended*” and to wait for the Initiator to clarify the doubts before evaluating the Configuration Change again.
- If the Configuration Change was approved, the people who has initiated the Configuration Change must carry out the corresponding actions and inform the

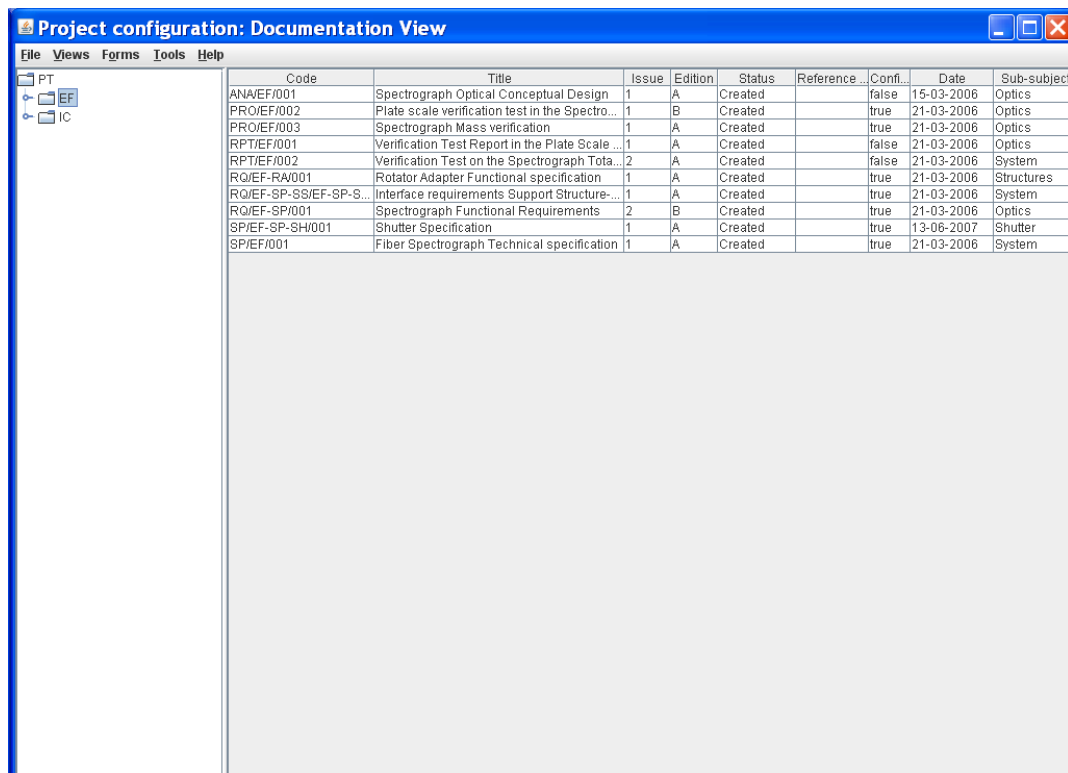
Configuration Management Team if the Configuration Change can be “Closed” or “Withdraw” (if, for any reason, the Configuration Change can not be finally implemented).

GECO provides the support to manage and archive the Configuration Changes. In this sense, all the relevant information generated during the Configuration Change life-cycle can be introduced and maintained in the application. GECO will also help in the Configuration Change coordination and information distribution by sending emails at the most important Configuration Change life-cycle transitions.

Finally, in order to understand the importance of having the Configuration Change information easily accessible, it is useful to mention that the current configuration of a system is composed by the approved Configuration Elements and the Configuration Changes.

11.2 Creating a new Configuration Change

Starting at the Main Window of the application,



| Code | Title | Issue | Edition | Status | Reference | Conf. | Date | Sub-subject |
|------------------------|---|-------|---------|---------|-----------|-------|------------|-------------|
| ANAEF/001 | Spectrograph Optical Conceptual Design | 1 | A | Created | | false | 15-03-2006 | Optics |
| PRO/EF/002 | Plate scale verification test in the Spectro... | 1 | B | Created | | true | 21-03-2006 | Optics |
| PRO/EF/003 | Spectrograph Mass verification | 1 | A | Created | | true | 21-03-2006 | Optics |
| RPT/EF/001 | Verification Test Report in the Plate Scale... | 1 | A | Created | | false | 21-03-2006 | Optics |
| RPT/EF/002 | Verification Test on the Spectrograph Tota... | 2 | A | Created | | false | 21-03-2006 | System |
| RQ/EF-RA/001 | Rotator Adapter Functional specification | 1 | A | Created | | true | 21-03-2006 | Structures |
| RQ/EF-SP-SS/EF-SP-S... | Interface requirements Support Structure-... | 1 | A | Created | | true | 21-03-2006 | System |
| RQ/EF-SP/001 | Spectrograph Functional Requirements | 2 | B | Created | | true | 21-03-2006 | Optics |
| SPI/EF-SP-SH/001 | Shutter Specification | 1 | A | Created | | true | 13-06-2007 | Shutter |
| SPI/EF/001 | Fiber Spectrograph Technical specification | 1 | A | Created | | true | 21-03-2006 | System |

Figure 101: Main window of the application

The following steps must be executed in order to create a new Configuration Change:

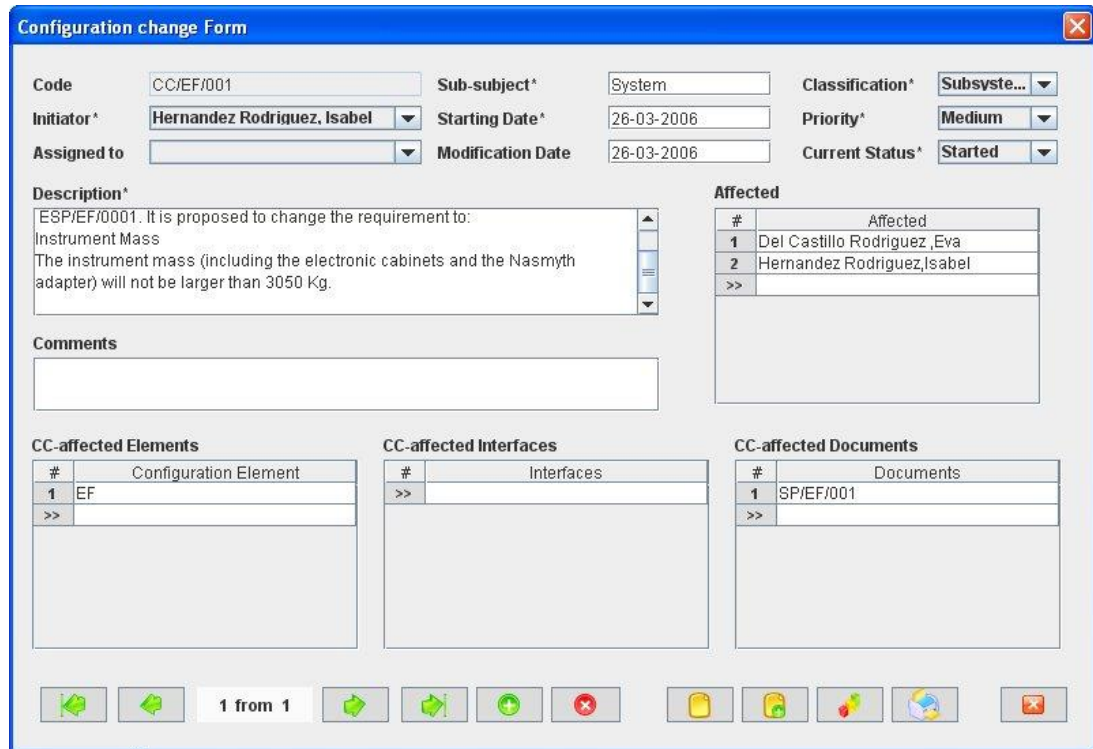
A. Open the Configuration Changes Form.

In the Main window, the Configuration Changes Form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Configuration Changes Form* or press *ALT+O+C*.

The Configuration Changes Form will be opened with all available records selected.



| # | Affected |
|----|-----------------------------|
| 1 | Del Castillo Rodriguez, Eva |
| 2 | Hernandez Rodriguez, Isabel |
| >> | |

| # | Configuration Element |
|----|-----------------------|
| 1 | EF |
| >> | |

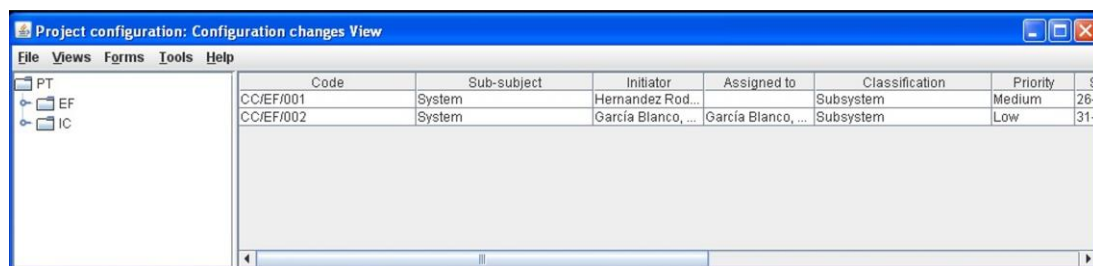
| # | Interfaces |
|----|------------|
| >> | |

| # | Documents |
|----|-----------|
| 1 | SP/EF/001 |
| >> | |

Figure 102: Configuration Changes Form showing all the selected records

A.II. Selecting a Configuration Change in the Configuration Changes View.

In the Main window, click the *Views Menu* \Rightarrow *Configuration Changes View* or press *ALT+V+C*.

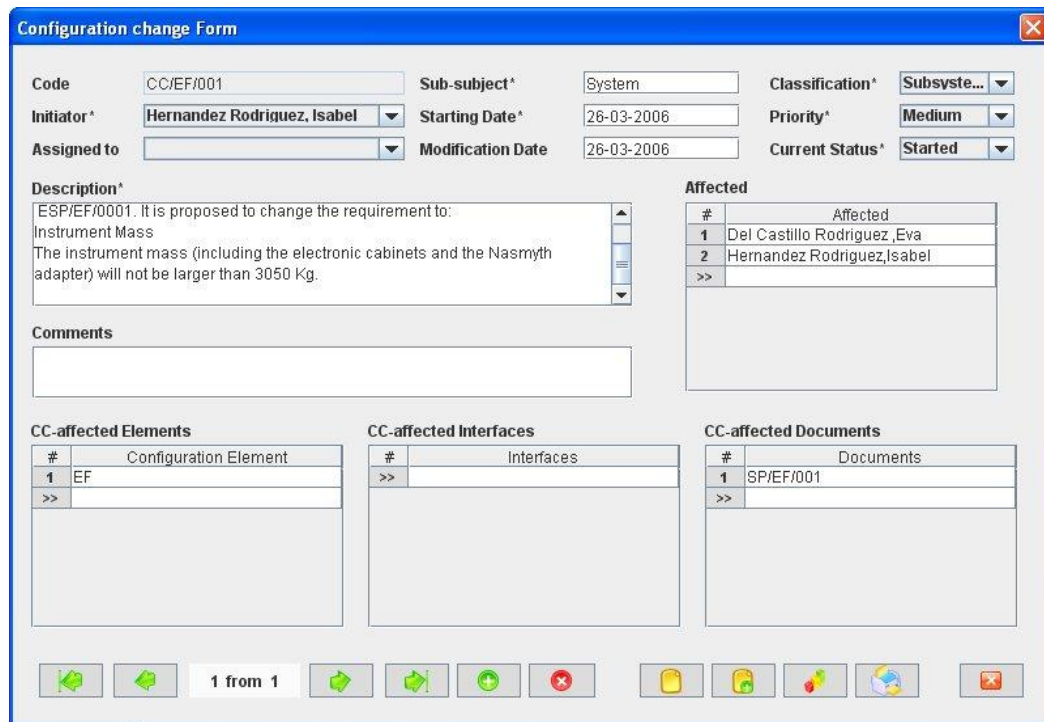


| Code | Sub-subject | Initiator | Assigned to | Classification | Priority | S |
|-----------|-------------|--------------------|--------------------|----------------|----------|-----|
| CC/EF/001 | System | Hernandez Rod... | | Subsystem | Medium | 26- |
| CC/EF/002 | System | García Blanco, ... | García Blanco, ... | Subsystem | Low | 31- |

Figure 103: Configuration Changes View (right panel) showing all the selected Configuration Changes associated to the selected PT element (left panel)

Select a Configuration Change among the Configuration Changes listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Configuration Changes Form will be opened with the selected record available only.



Configuration change Form

Code: CC/EF/001 Sub-subject*: System Classification*: Subsystem...
 Initiator*: Hernandez Rodriguez, Isabel Starting Date*: 26-03-2006 Priority*: Medium
 Assigned to: Modification Date: 26-03-2006 Current Status*: Started

Description*
 ESP/EF/0001. It is proposed to change the requirement to:
 Instrument Mass
 The instrument mass (including the electronic cabinets and the Nasmyth
 adapter) will not be larger than 3050 Kg.

Affected

| # | Affected |
|----|-----------------------------|
| 1 | Del Castillo Rodriguez, Eva |
| 2 | Hernandez Rodriguez, Isabel |
| >> | |

Comments

CC-affected Elements

| # | Configuration Element |
|----|-----------------------|
| 1 | EF |
| >> | |

CC-affected Interfaces

| # | Interfaces |
|----|------------|
| >> | |

CC-affected Documents

| # | Documents |
|----|-----------|
| 1 | SP/EF/001 |
| >> | |

1 from 1

Figure 104: Configuration Changes Form showing only the selected record

B. Add a new record.

In the Configuration Changes Form, new Configuration Changes can be created in two different ways:

B.I. Starting an empty Configuration Change.

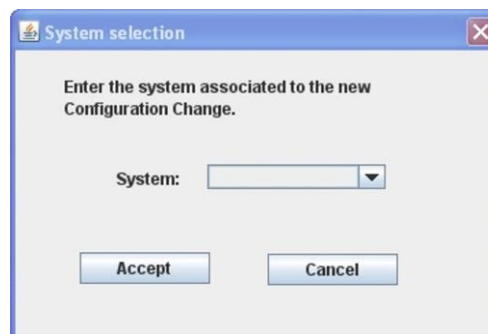
In the Configuration Changes Form, click the *Add* button to add a new record,



A new window will appear,

⇒ select the System PT element code in the *System* combo box (only the PT elements at system level are accessible),

⇒ click *Accept*,



System selection

Enter the system associated to the new Configuration Change.

System:

Accept Cancel

Figure 105: Configuration Changes Form

The new Configuration Change **Code** will be automatically generated as the first one available for the Configuration Change Product Tree element code selected.

All Configuration Changes Codes follow the same pattern as described below:

CC/PT/nnn

where,

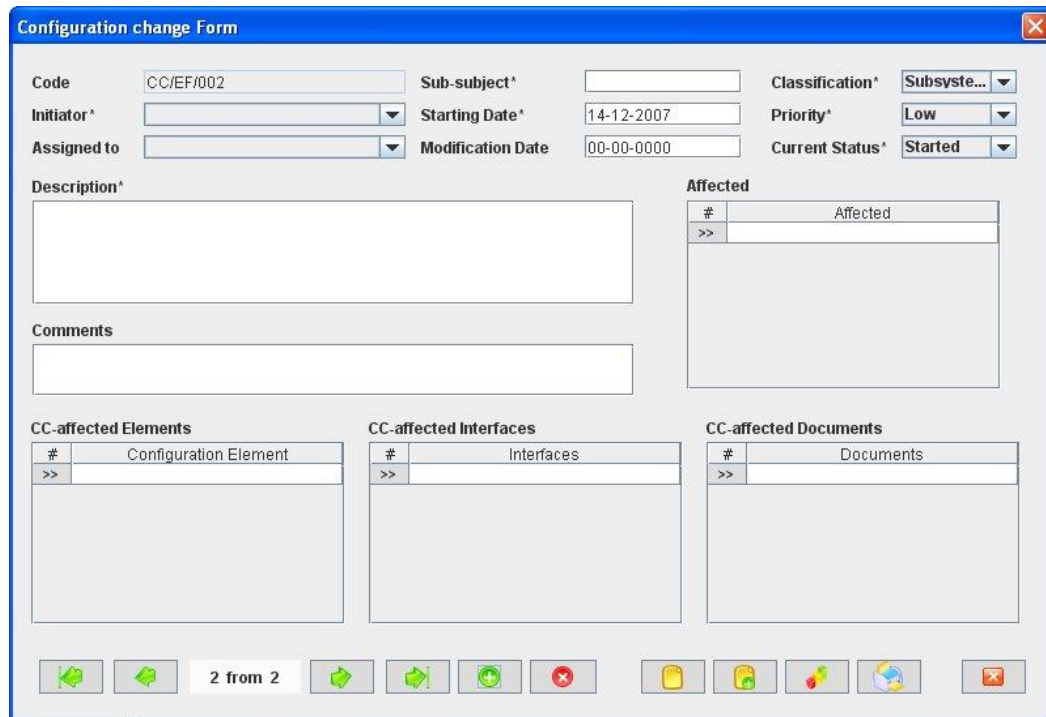
CC: Configuration Change (these characters are always the same for all Configuration Changes)

PT: Product Tree Element code

nnn: Sequence number that will be automatically generated by the application

The Configuration Change Code is unique for each Configuration Change.

The Requirement code convention is defined before starting to use GECO. More information about it can be found in section 16.



The screenshot shows the 'Configuration change Form' window. It contains several input fields and sections:

- Code:** CC/EF/002
- Sub-subject:** (empty)
- Classification:** Subsystem...
- Initiator:** (dropdown)
- Starting Date:** 14-12-2007
- Priority:** Low
- Assigned to:** (dropdown)
- Modification Date:** 00-00-0000
- Current Status:** Started
- Description:** (large text area)
- Comments:** (text area)
- Affected:** Table with columns # and Affected.
- CC-affected Elements:** Table with columns # and Configuration Element.
- CC-affected Interfaces:** Table with columns # and Interfaces.
- CC-affected Documents:** Table with columns # and Documents.

At the bottom, there is a toolbar with various icons, including a 'Copy' button (a yellow folder icon).

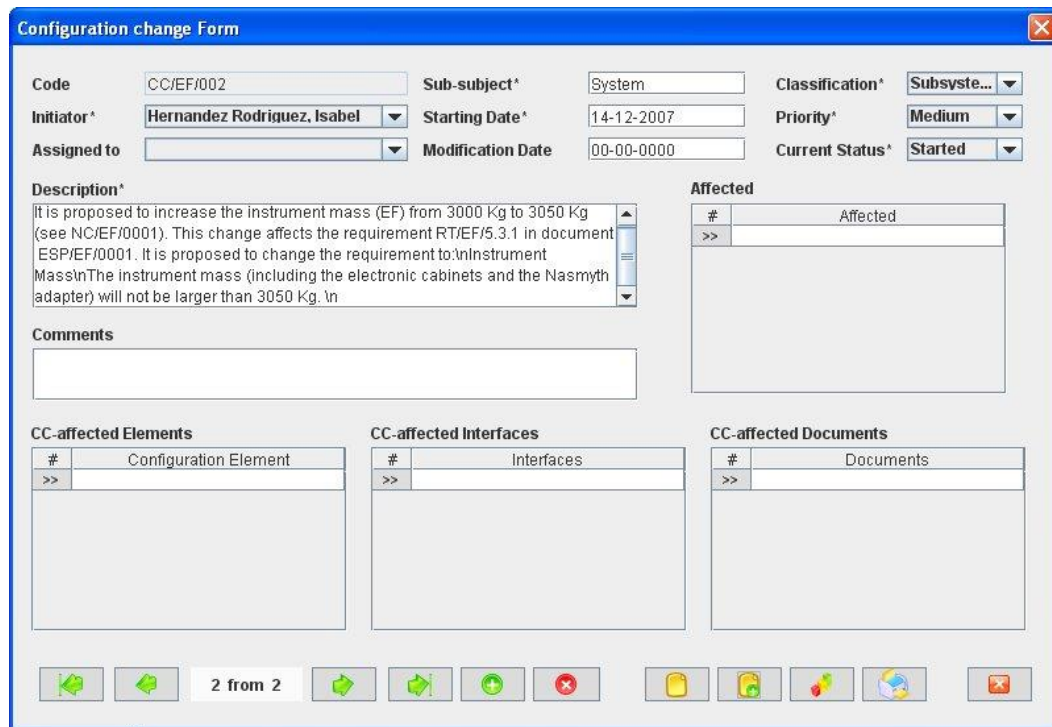
Figure 106: Configuration Changes Form once the PT System has been chosen as shown in Figure 105

B.II. Cloning an already existing Configuration Change.

In the Configuration Changes Form, click the *Copy button* to clone the Configuration Change that is currently selected in the form,



The new Configuration Change **Code** will be automatically generated as the first one available for the same Configuration Change Product Tree element code of the Configuration Change that has been cloned.



The screenshot shows the 'Configuration change Form' window. It contains several input fields and sections:

- Code:** CC/EF/002
- Sub-subject*:** System
- Classification*:** Subsystem...
- Initiator*:** Hernandez Rodriguez, Isabel
- Starting Date*:** 14-12-2007
- Priority*:** Medium
- Assigned to:** (empty dropdown)
- Modification Date:** 00-00-0000
- Current Status*:** Started
- Description*:** It is proposed to increase the instrument mass (EF) from 3000 Kg to 3050 Kg (see NC/EF/0001). This change affects the requirement RT/EF/5.3.1 in document ESP/EF/0001. It is proposed to change the requirement to: Instrument Mass. The instrument mass (including the electronic cabinets and the Nasmyth adapter) will not be larger than 3050 Kg.
- Comments:** (empty text area)
- Affected:** (empty table with header # and Affected)
- CC-affected Elements:** (empty table with header # and Configuration Element)
- CC-affected Interfaces:** (empty table with header # and Interfaces)
- CC-affected Documents:** (empty table with header # and Documents)

At the bottom, there is a status bar showing '2 from 2' and several icons for navigation and actions.

Figure 107: Configuration Changes Form ready to introduce a new Configuration change by cloning an existing record

C. Fill in the new record.

In the Configuration Changes Form, the mandatory fields that must be filled in are the following ones:

- **Code.** The Configuration Change code is automatically generated by the application and cannot be modified.
- **Sub-subject.** Indicate which subsystem (or group inside the organization) is affected by the Configuration Change. This is a text field and the maximum length of this field is 20 characters.
- **Classification combo box.** Select the Configuration change type among the options offered in the Classification combo box, which includes the following ones:
 - *System* (the Configuration change affects to more than one particular subsystem)
 - *Subsystem* (the Configuration change affects to one subsystem only)

By default, the classification is “Subsystem”.

- **Initiator.** Identify the person that is creating the Configuration Change. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Starting date.** Indicate the date when the Configuration Change is being created. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.



- **Priority combo box.** Select the Configuration change priority among the options offered in the Priority combo box, which includes the following ones:
 - *High*
 - *Medium*
 - *Low*

By default, the classification is “*Low*”.

- **Current status combo box.** Select the Configuration Change status among the options offered in the Status combo box, which includes the following ones:
 - *Started*
 - *Approved*
 - *Rejected*
 - *Suspended*
 - *Closed*
 - *Withdraw*

When the Configuration Change is created, the default status is “*Started*”.

- **Description.** Describe the change that must be done in the system. This is a text field and it does not have a maximum length limit.

The rest of the fields that could be filled are the following ones:

- **Comments.** Introduce any additional comment related to the Configuration Change. This is a text field and the maximum length of this field is 300 characters.
- **Affected.** Identify the persons that can be affected by the Configuration Change (as many persons as wanted can be selected). The affected persons will receive by email the notification related to the Configuration Change modifications. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **CC-affected elements.** Identify the PT elements that are affected by the Configuration Change (as many elements as wanted can be selected). In the combo box, all PT elements existing in the application can be selected.
- **CC-affected interfaces.** Identify the Interfaces that are affected by the Configuration Change (as many Interfaces as wanted can be selected). In the combo box, all Interfaces existing in the application can be selected.
- **CC-affected documents.** Identify the Documents that are affected by the Configuration Change (as many Documents as wanted can be selected). In the combo box, all Documents existing in the application can be selected.

The fields *Assigned to* and *Modification date* should not be filled at the creation of the Configuration Change. These fields must be filled at the CRB where the Configuration Change is reviewed.

D. Save the new record.

In the Configuration Changes Form, click the *Save* button to save the record,



If the current record is not saved, the new record will not be created.

Once the Configuration Change is saved, the application will send an email to notify that the Configuration Change has been created.

“The current status of the Configuration Change (Code) is (new status)” to be sent to the Initiator, the person assigned to do it (if exists) and the affected persons (if exists).

E. Close the Configuration Changes Form

In the Configuration Changes Form, click the *Exit* button to exit the form,



If the record has been saved, the Configuration Changes Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 108: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Configuration Changes Form.

11.3 Selecting a particular Configuration Change

In the Main window, the form view of a particular Configuration Change can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms* Menu ⇒ *Configuration Changes* Form or press *ALT+O+C*.

In order to find a particular Configuration Change, the following actions can be done:

⇒ Use the arrows for moving among the Configuration Changes currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

⇒ Use the *Filter* button to filter/un-filter the set of Configuration Changes currently selected in the form,



A new window will appear:

⇒ Click *Data filter activated* box to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),

⇒ select in the *Field* combo box the desired field to filter the data,

⇒ select in the *Op* combo box how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

⇒ write in the *Value Text* Field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

⇒ define as many filters as wanted (by adding new lines),

⇒ click *Accept*,



The dialog box titled "Configuration Change Filter" contains a checked checkbox labeled "Data filter activated". Below this is a table with four columns: "#", "Field", "Op", and "Value". The first row of the table has a ">>" button in the "#" column and empty cells for "Field", "Op", and "Value". Below the table is a large empty text area for additional filters. At the bottom of the dialog are "Accept" and "Reset" buttons.

| # | Field | Op | Value |
|----|-------|----|-------|
| >> | | | |

Figure 109: Configuration Cxchanges Filter to select the desired documents by different fields

B. Selecting the Configuration Change in the Configuration Changes View.

In the Main window, click the *Views Menu* \Rightarrow *Configuration Changes View* or press *ALT+V+C*.

In order to constrain (by Product Tree Element or by filtering) the number of Configuration Changes listed in the view, see the steps to be followed in section 4.2.

Select the desired Configuration Change among the Configuration Changes listed in the table at the right side of the window by double-clicking with the left button of the mouse.

11.4 Modifying existing Configuration Changes

The Configuration Change to be modified must be already selected, which will be done by following the steps described in section 11.3.

In the Configurations Change Form, the following steps must be done in order to modify the selected Configuration Change.

A. Modify the desired fields.

Make the desired changes in the Configurations Change fields, taking into account the constraints identified in section 11.2, numbered item C) and, also, that the *Code*, *Initiator* and *Starting date* fields cannot be modified once the Configuration Change has been already created.

All the rest of the fields can be modified and, in particular, the following fields must be filled after the CRB meeting where the Configuration Change is presented:

- **Assigned to.** Identify the person that is going to do the Configuration Change actions. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Modification date.** Indicate the date when the Configuration Change is being modified. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.

B. Save the modified record.

In the Configuration Changes Form, click the *Save* button to save the record,



If the record is not saved, the changes will not be applied.

Once the Configuration Change is saved, the application will send an email to notify that a modification has been done to the Configuration Change. This notification could be the following ones depending of the modification done

“The current status of the Configuration Change (Code) is (new status)” to be sent to the Initiator, the person assigned to do it and the affected persons whenever the status is changed.

“The Assigned person to the Configuration Change (Code) has been changed” to be sent to the initiator, to the previous people assigned and to the new one.

C. Close the Configuration Changes Form

In the Configurations Changes Form, click the *Exit button* to exit the form,



If the record has been saved, the Configuration Changes Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

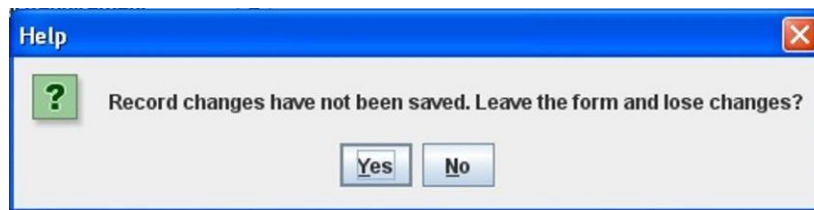


Figure 110: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Configuration Changes Form.

11.5 Printing a Configuration Change

The Configuration Change to be printed must be already selected, which will be done by following the steps described in section 11.3.

In the Configurations Change Form, the following step must be done in order to print the selected Configuration Change.

A. Print the record.

In the Configuration Changes Form, click the *Print button* to print the record,



A preview of the record to be printed will appear.

Page preview
✖

Configuration change report

Code:

Sub-subject:

Starting date:

Classification:

Priority:

Initiator:

Assigned to:

Modification date:

Current status:

Description

It is proposed to increase the instrument mass (EF) from 3000 Kg to 3050 Kg (see CC/EF/0001). This change affects the requirement RT/EF/5.3.1 in document ESP/EF/0001. It is proposed to change the requirement to:

Instrument Mass

The instrument mass (including the electronic cabinets and the Nasmyth adapter) will not be larger than 3050 Kg.

Comments

Affected Users

| # | Affected |
|-----|-----------------------------|
| 1 | Del Castillo Rodriguez, Eva |
| 2 | Hernandez Rodriguez, Isabel |
| ... | |

CC-affected Elements

| # | Configuration Element |
|-----|-----------------------|
| 1 | EF |
| ... | |

CC-affected Interfaces

| # | Interfaces |
|-----|------------|
| ... | |

CC-affected Documents

| # | Documents |
|-----|-----------|
| 1 | SP/EF/001 |
| ... | |

Figure 111: Preview window for the Configuration change to be printed.

⇒ Select the *Print button* to print the record,

or,

⇒ Select *Cancel button* to come back to the Configuration Change form without printing.

If the *Print button* is selected, the application will look for the printers connected to your computer and the print menu will be opened.

A new window will appear,

⇒ select in the *Name combo box* the printer to be used,

⇒ define the desired properties for this job,

⇒ click *Accept*,

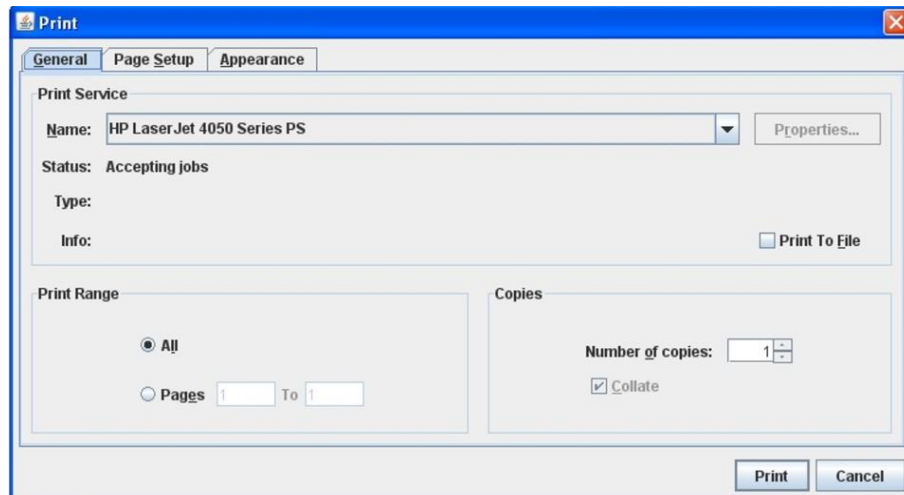


Figure 112: Print Dialog. The selected record will be printed

11.6 Deleting a Configuration Change

The Configuration Change to be deleted must be already selected, which will be done by following the steps described in section 11.3.

In the Configuration Changes Form, the following steps must be done in order to delete the selected Configuration Change.

A. Delete the record.

In the Configuration Changes Form, click the *Delete button* to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

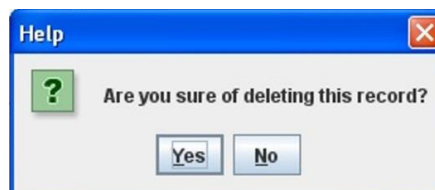


Figure 113: Warning Window to check if the user wants to delete the record

⇒ Click *YES* to delete the record.

⇒ Click *NO* to exit without deleting.

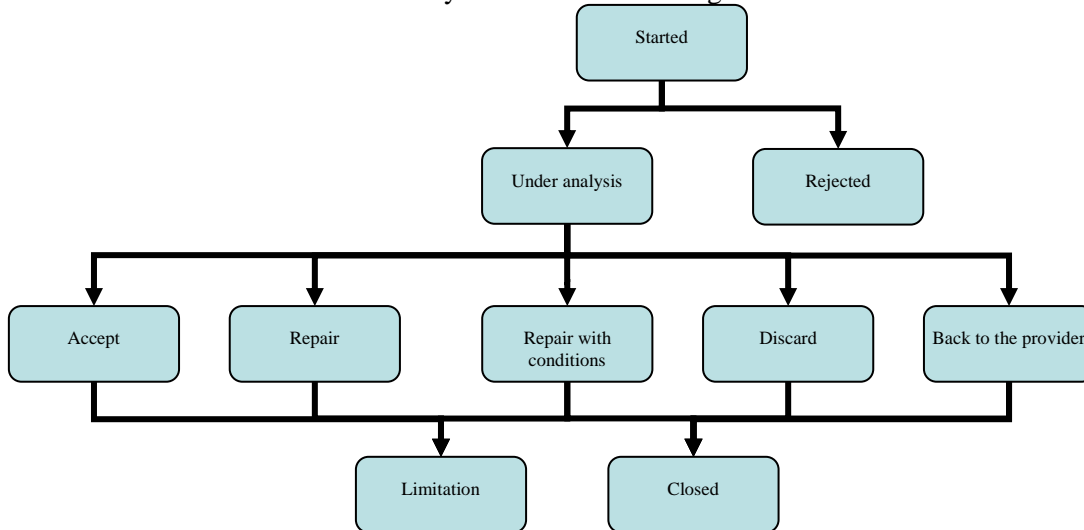
12. NON-CONFORMITIES

12.1 What is a Non-conformity?

A Non-conformity is defined as the non-fulfilment of a specified requirement.

A Non-conformity is normally raised by the Contractor (or the group that is developing a system) of system after realising that they cannot achieve a particular requirement

The Non-conformities follow a life-cycle as shown in the figure:



This life-cycle can be briefly summarized in the following steps:

- In the first place, the Non-conformity request must be introduced in the application. It is important that all relevant information related to this particular Non-conformity must be identified to allow the NRB (Non-conformity Review Board) evaluates the Non-conformity implication. . At that point, the Non-conformity status is “*Started*”.
- In the NRB meeting, the Non-conformity is analysed and the Non-conformity state can be changed to “*Under analysis*” or “*Rejected*” depending of the board decision. If the Non-conformity is classified as “*Under Analysis*” then the people in charge (*Assigned to*) must be defined, who will be in charge to analyse it in more in detail.
- After the necessary analysis is performed, the Non-conformity responsible can request to change the state of the Non-conformity to “*Accept*” (i.e., the item is found to be useful as it is), “*Repair*” (i.e., the item must be repaired to fulfil the requirements), “*Repair with conditions*” (i.e., the item must be repaired although a change in the scope of the requirements is accepted), “*Discard*” (i.e., the item is not usable as it is) or “*Back to the provider*” (i.e., the item cannot be accepted and it is returned to the provider, who must provide another one).
- Finally, the NRB must take into account the analysis made by the responsible in order to decide if the Non-conformity is ending as “*Closed*” or as a “*Limitation*” (i.e., the Non-conformity is not going to be solved and it must be accepted as a Limitation of the system). One of the actions that could be performed during the Non-conformity life is to raise a Configuration Change to request a modification of the requirements according to the Non-conformity analysis.

GECO provides the support to manage and archive the Non-conformities. In this sense, all the relevant information generated during the Non-conformity life-cycle can be introduced and maintained in the application. GECO will also help in the Non-conformity coordination and information distribution by sending emails at the most important Non-conformity life-cycle transitions.

12.2 Creating a Non-conformity

Starting at the Main Window of the application,

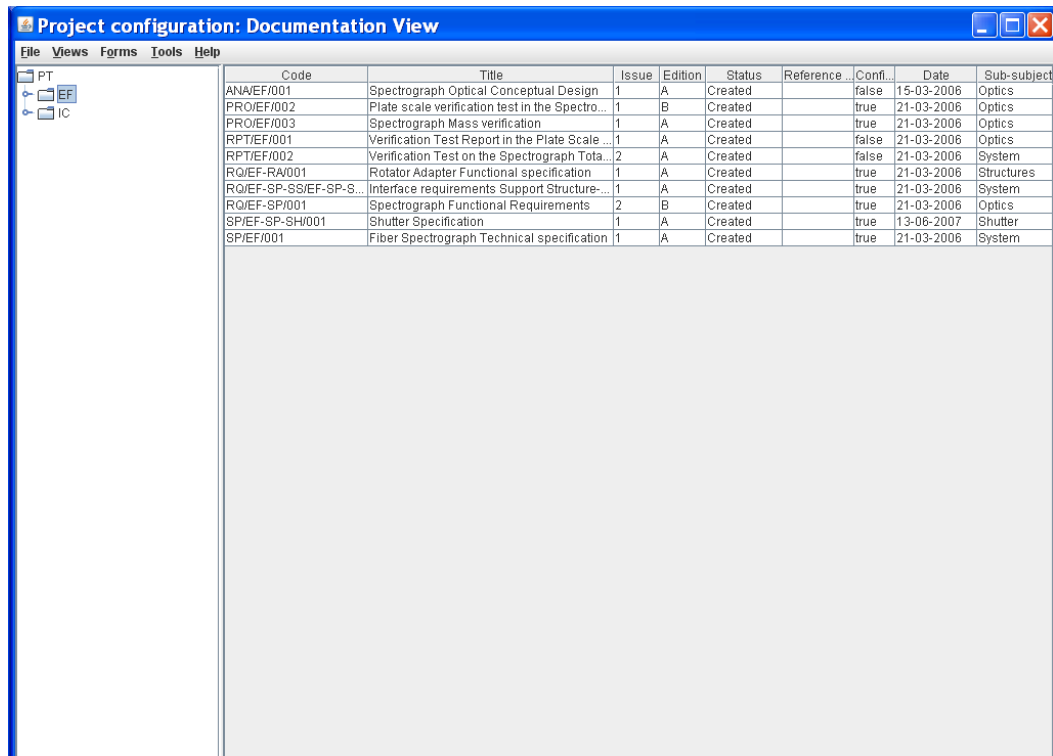


Figure 114: Main window of the application

the following steps must be executed in order to create a new Non-conformity:

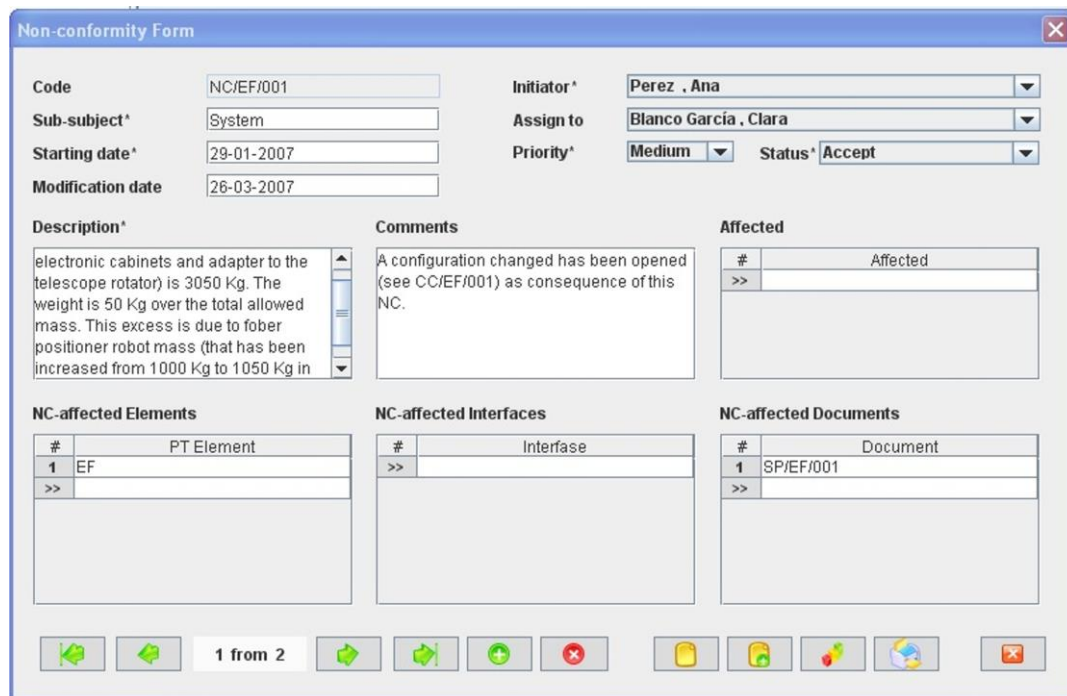
A. Open the Non-conformities Form.

In the Main window, the Non-conformities Form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms Menu* \Rightarrow *Non-conformities Form* or press *ALT+O+N*.

The Non-conformities Form will be opened with all available records selected.



Non-conformity Form

Code: NC/EF/001 Initiator*: Perez , Ana
 Sub-subject*: System Assign to: Blanco García , Clara
 Starting date*: 29-01-2007 Priority*: Medium Status*: Accept
 Modification date: 26-03-2007

Description*
 electronic cabinets and adapter to the telescope rotator) is 3050 Kg. The weight is 50 Kg over the total allowed mass. This excess is due to fober positioner robot mass (that has been increased from 1000 Kg to 1050 Kg in

Comments
 A configuration changed has been opened (see CC/EF/001) as consequence of this NC.

Affected

| # | Affected |
|----|----------|
| >> | |

NC-affected Elements

| # | PT Element |
|----|------------|
| 1 | EF |
| >> | |

NC-affected Interfaces

| # | Interfase |
|----|-----------|
| >> | |

NC-affected Documents

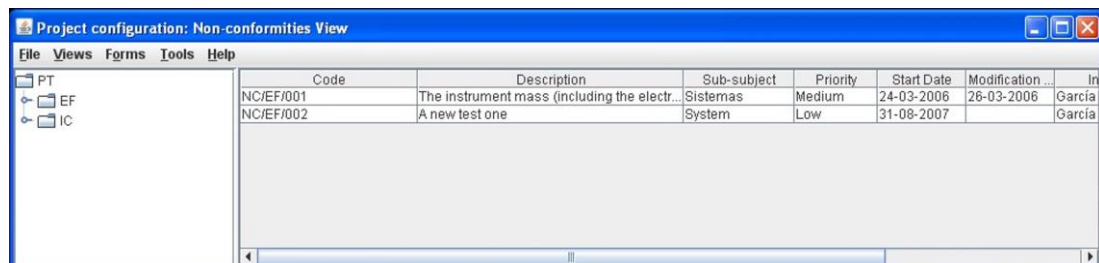
| # | Document |
|----|-----------|
| 1 | SP/EF/001 |
| >> | |

1 from 2

Figure 115: Non-conformities Form showing all the selected records

A.II. Selecting a Non-conformity in the Non-conformities View.

In the Main window, click the Views Menu \Rightarrow Non-conformities View or press ALT+V+N



Project configuration: Non-conformities View

File Views Forms Tools Help

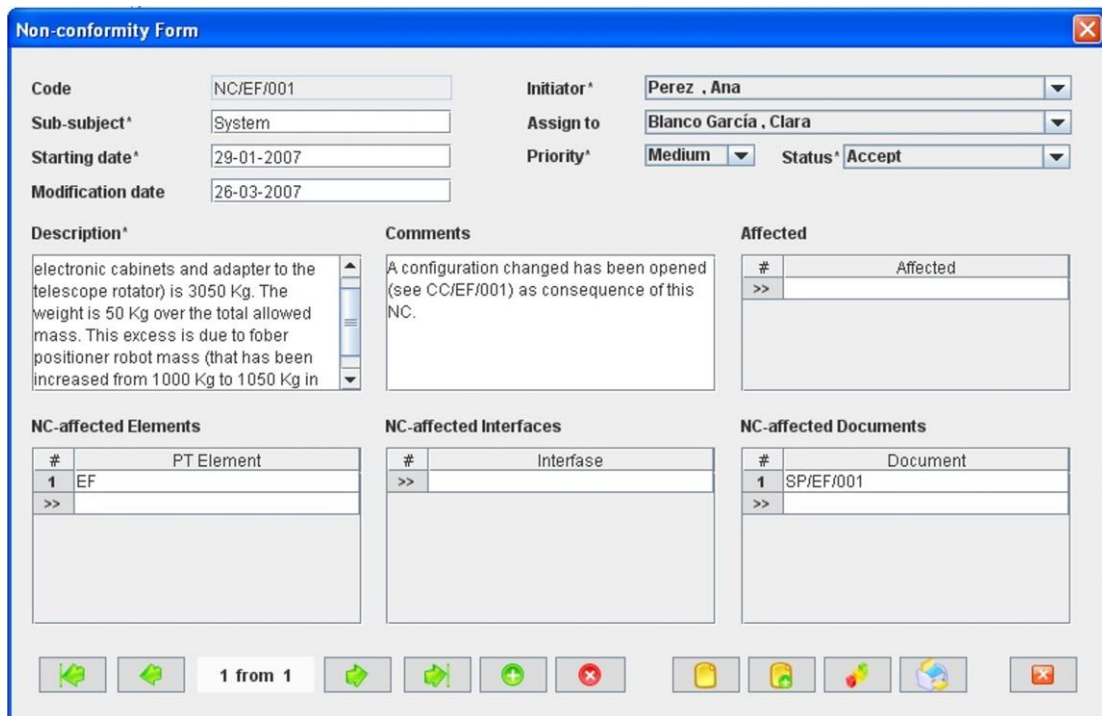
| Code | Description | Sub-subject | Priority | Start Date | Modification ... | In |
|-----------|--|-------------|----------|------------|------------------|--------|
| NC/EF/001 | The instrument mass (including the electr... | Sistemas | Medium | 24-03-2006 | 26-03-2006 | García |
| NC/EF/002 | A new test one | System | Low | 31-08-2007 | | García |

PT EF IC

Figure 116: Non-conformities View (right panel) showing all the selected Non-conformities associated to the selected PT element (left panel)

Select a Non-conformity among the Non-conformities listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Non-conformities Form will be opened with the selected record available only.



Non-conformity Form

Code: NC/EF/001 Initiator*: Perez , Ana
 Sub-subject*: System Assign to: Blanco García , Clara
 Starting date*: 29-01-2007 Priority*: Medium Status*: Accept
 Modification date: 26-03-2007

Description*
 electronic cabinets and adapter to the telescope rotator) is 3050 Kg. The weight is 50 Kg over the total allowed mass. This excess is due to fober positioner robot mass (that has been increased from 1000 Kg to 1050 Kg in

Comments
 A configuration changed has been opened (see CC/EF/001) as consequence of this NC.

Affected

| # | Affected |
|----|----------|
| >> | |

NC-affected Elements

| # | PT Element |
|----|------------|
| 1 | EF |
| >> | |

NC-affected Interfaces

| # | Interface |
|----|-----------|
| >> | |

NC-affected Documents

| # | Document |
|----|-----------|
| 1 | SP/EF/001 |
| >> | |

1 from 1

Figure 117: Non-conformity Form showing only the selected record

B. Add a new record.

In the Non-conformities Form, new Non-conformities can be created in two different ways:

B.I. Starting an empty Non-conformity.

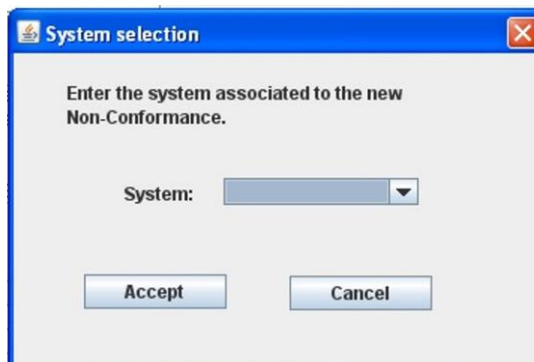
In the Non-conformities Form, click the *Add* button to add a new record,



A new window will appear,

⇒ select the System PT element code in the *System* combo box (only the PT elements at system level can be selected),

⇒ click *Accept*,



System selection

Enter the system associated to the new Non-Conformance.

System:

Accept Cancel

Figure 118: Non-conformities Form

The new Non-conformity **Code** will be automatically generated as the first one available for the Non-conformity Product Tree element code selected.

All Non-conformities Codes follow the same pattern as described below:

NC/PT/nnn

where,

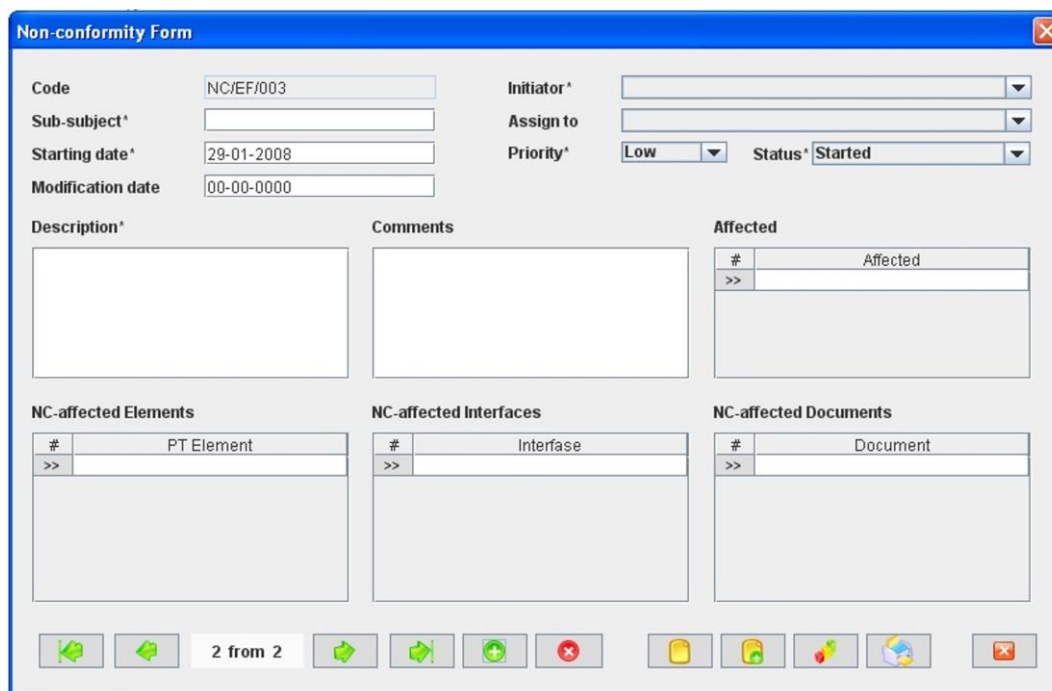
NC: Non-conformity (these characters are always the same for all Non-conformities)

PT: Product Tree Element code

nnn: Sequence number that will be automatically generated by the application

The Non-conformity Code is unique for each Non-conformity.

The Requirement code convention is defined before starting to use GECO. More information about it can be found in section 16.



The screenshot shows the 'Non-conformity Form' window. It contains several input fields and sections:

- Code:** NC/EF/003
- Sub-subject*:** (empty)
- Starting date*:** 29-01-2008
- Modification date:** 00-00-0000
- Initiator*:** (dropdown menu)
- Assign to:** (dropdown menu)
- Priority*:** Low
- Status*:** Started
- Description*:** (text area)
- Comments:** (text area)
- Affected:** (table with columns # and Affected)
- NC-affected Elements:** (table with columns # and PT Element)
- NC-affected Interfaces:** (table with columns # and Interface)
- NC-affected Documents:** (table with columns # and Document)

At the bottom, there is a toolbar with icons for navigation and actions, and a status bar showing '2 from 2'.

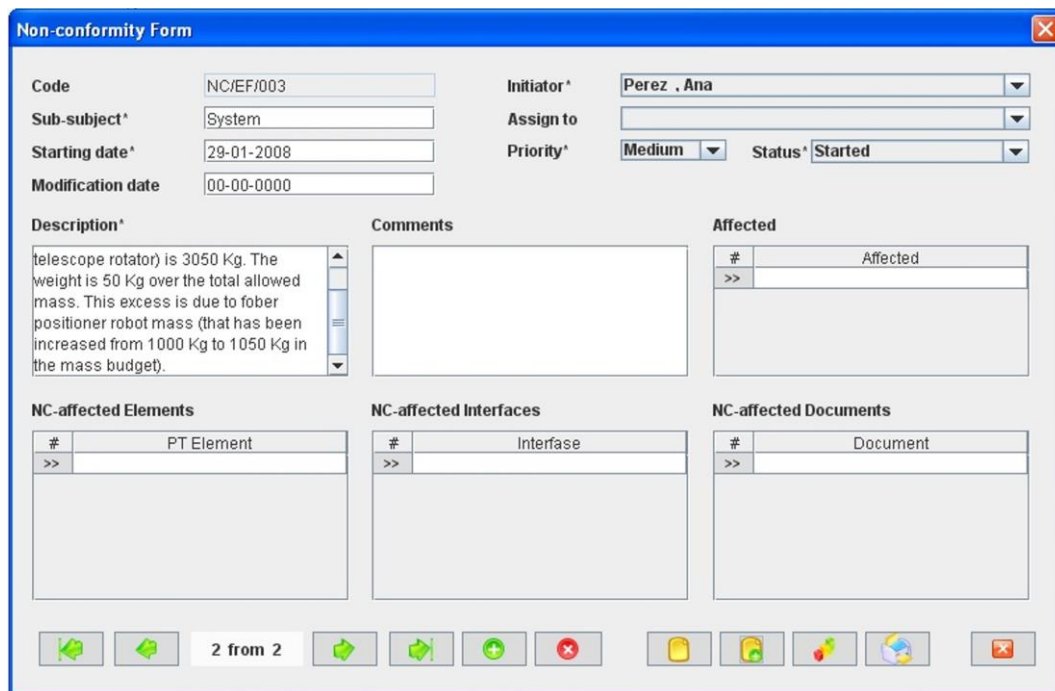
Figure 119: Non-conformities Form once the PT System has been chosen as shown in Figure 118

B.II. Cloning an already existing Non-conformity.

In the Non-conformity Form, click the *Copy button* to clone the Non-conformity that is currently selected in the form,



The new Non-conformity **Code** will be automatically generated as the first one available for the same Non-conformity Product Tree element code of the Non-conformity that has been cloned.



The screenshot shows a 'Non-conformity Form' window. It contains several input fields and dropdown menus. The 'Code' field is 'NC/EF/003'. The 'Sub-subject' field is 'System'. The 'Starting date' field is '29-01-2008'. The 'Modification date' field is '00-00-0000'. The 'Initiator' dropdown is 'Perez , Ana'. The 'Assign to' dropdown is empty. The 'Priority' dropdown is 'Medium'. The 'Status' dropdown is 'Started'. The 'Description' field contains text about a telescope rotator. The 'Comments' field is empty. The 'Affected' field is empty. Below these are three tables: 'NC-affected Elements', 'NC-affected Interfaces', and 'NC-affected Documents'. Each table has a header row with a '#' column and a body with a '>>' button. At the bottom, there is a toolbar with icons for saving, deleting, and other actions, along with a '2 from 2' indicator.

Figure 120: Non-conformities Form ready to introduce a new Non-conformity by cloning an existing record

C. Fill in the new record.

In the Non-conformity Form, the mandatory fields that must be filled in are the following ones:

- **Code.** The Non-conformity code is automatically generated by the application and cannot be modified.
- **Sub-subject.** Indicate which subsystem (or group inside the organization) is affected by the Non-conformity. This is a text field and the maximum length of this field is 20 characters.
- **Initiator.** Identify the person that is creating the Non-conformity. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Starting date.** Indicate the date when the Non-conformity is being created. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Priority combo box.** Select the Non-conformity priority among the options offered in the Priority combo box, which includes the following ones:
 - *High*
 - *Medium*
 - *Low*

By default, the classification is “Low”.



- **Status combo box.** Select the Non-conformity status among the options offered in the Status combo box, which includes the following ones:
 - *Started*
 - *Under analysis*
 - *Rejected*
 - *Accept*
 - *Repair*
 - *Repair with conditions*
 - *Discard*
 - *Back to the provider*
 - *Closed*
 - *Limitation*

When the Non-conformity is created, the default status is “*Started*”.

- **Description.** Describe the Non-conformity in detail, identifying the requirements that are not meet and the consequences that the Non-conformity in meeting the objectives of the system. This is a text field and it does not have a maximum length limit.

The rest of the fields that could be filled are the following ones:

- **Comments.** Introduce any additional comment related to the Non-conformity. This is a text field and it does not have a maximum length limit.
- **Affected.** Identify the persons that can be affected by the Non-conformity (as many persons as wanted can be selected). The affected persons will receive by email the notification related to the Non-conformity modifications. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **NC-affected Elements.** Identify the PT elements that are affected by the Non-conformity (as many elements as wanted can be selected). In the combo box, all PT elements existing in the application can be selected.
- **NC-affected Interfaces.** Identify the Interfaces that are affected by the Non-conformity (as many Interfaces as wanted can be selected). In the combo box, all Interfaces existing in the application can be selected.
- **NC-affected Documents.** Identify the Documents that are affected by the Non-conformity (as many Documents as wanted can be selected). In the combo box, all Documents existing in the application can be selected.

The fields *Assigned to* and *Modification date* should not be filled at the creation of the Non-conformity. These fields must be filled at the NRB where the Non-conformity is reviewed.

D. Save the new record.

In the Non-conformities Form, click the *Save* button to save the record,



If the current record is not saved, the new record will not be created.

Once the Non-conformity is saved, the application will send an email to notify that the Non-conformity has been created.

“The current status of the Non-conformity (Code) is (new status)” to be sent to the Initiator, the person assigned to do it (if exists) and the affected persons (if exists).

E. Close the Non-conformities Form

In the Non-conformities Form, click the *Exit* button to exit the form,



If the record has been saved, the Non-conformities Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

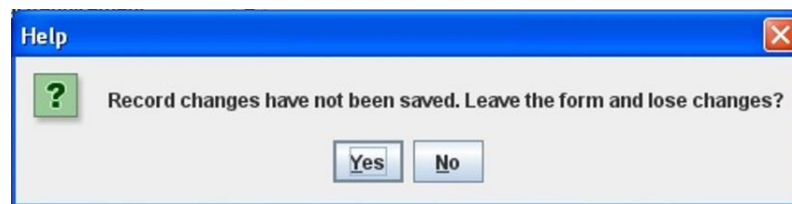


Figure 121: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving

⇒ Click *NO* to come back to the Non-conformities Form.

12.3 Selecting a particular Non-conformity

In the Main window, the form view of a particular Non-conformity can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms* Menu ⇒ *Non-conformities* Form or press *ALT+O+N*.

In order to find a particular Non-conformity, the following actions can be done:

⇒ Use the arrows for moving among the Non-conformities currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

⇒ Use the *Filter* button to filter/un-filter the set of Non-conformities currently selected in the form,



A new window will appear:

- ⇒ Click *Data filter activated* box to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),
- ⇒ select in the *Field* combo box the desired field to filter the data,
- ⇒ select in the *Op* combo box how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)
- ⇒ write in the *Value Text* field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,
- ⇒ define as many filters as wanted (by adding new lines),
- ⇒ click *Accept*,



| # | Field | Op | Value |
|----|-------|----|-------|
| >> | | | |

Figure 122: Non-conformities Filter to select the desired documents by different fields

B. Selecting the Non-conformity in the Non-conformities View.

In the Main window, click the *Views* Menu ⇒ *Non-conformities* View or press *ALT+V+N*.

In order to constrain (by Product Tree Element or by filtering) the number of Non-conformities listed in the view, see the steps to be followed in section 4.2.

Select the desired Non-conformity among the Non-conformities listed in the table at the right side of the window by double-clicking with the left button of the mouse.

12.4 Modifying existing Non-conformities

The Non-conformity to be modified must be already selected, which will be done by following the steps described in section 12.3.

In the Non-conformities Form, the following steps must be done in order to modify the selected Non-conformity.

A. Modify the desired fields.

Make the desired changes in the Non-conformity fields, taking into account the constraints identified in section 12.2, numbered item C) and, also, that the *Code*, *Initiator* and *Starting date* fields cannot be modified once the Non-conformity has been already created.

All the rest of the fields can be modified and, in particular, the following fields must be filled after the NRB meeting where the Non-conformity is presented:

- **Assigned to.** Identify the person that is going to do the Non-conformity evaluation. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Modification date.** Indicate the date when the Non-conformity is being modified. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.

B. Save the modified record.

In the Non-conformities Form, click the *Save* button to save the record,



If the record is not saved, the changes will not be applied.

Once the Non-conformity is saved, the application will send an email to notify that a modification has been done to the Non-conformity. This notification could be the following ones depending of the modification done

“The current status of the Non-conformity (Code) is (new status)” to be sent to the Initiator, the person assigned to do it and the affected persons whenever the status is changed.

“The Assigned person to the Non-conformity (Code) has been changed” to be sent to the Initiator, to the previous responsible and to the new one.

C. Close the Non-conformities Form

In the Non-conformities Form, click the *Exit* button to exit the form,



If the record has been saved, the Non-conformities Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

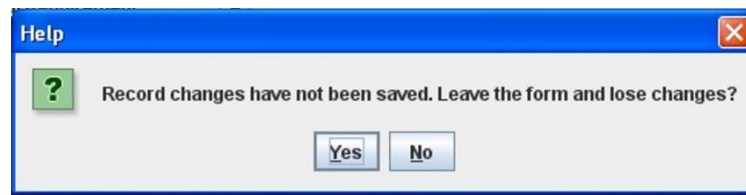


Figure 123: Warning Window reporting that changes have not been saved

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Non-conformities Form.

12.5 Printing a Non-conformity

The Non-conformity to be printed must be already selected, which will be done by following the steps described in section 12.3.

In the Non-conformity Form, the following step must be done in order to print the selected Non-conformity.

B. Print the record.

In the Non-conformity Form, click the *Print button* to print the record,



A preview of the record to be printed will appear.

Page preview
✕

Non-conformity report

| | | | |
|----------------|------------|--------------------|-----------------------|
| Code: | NC/EF/001 | Initiator: | Perez , Ana |
| Sub-subject: | System | Assign to: | Blanco García , Clara |
| Starting date: | 29-01-2007 | Modification date: | 26-03-2007 |
| Priority: | Medium | Status: | Accept |

Description

The instrument mass (including the electronic cabinets and adapter to the telescope rotator) is 3050 Kg. The weight is 50 Kg, the total allowed mass. This excess is due to fiber positioner robot mass (that has been increased from 1000 Kg to 1050 Kg) the mass budget).

Comments

A configuration changed has been opened (see CC/EF/001) as consequence of this NC.

Affected Users

| # | Affected |
|-----|----------|
| >>> | |

NC-affected Elements

| # | PT Element |
|-----|------------|
| 1 | EF |
| >>> | |

NC-affected Interfaces

| # | Interface |
|-----|-----------|
| >>> | |

NC-affected Documents

| # | Document |
|-----|-----------|
| 1 | SP/EF/001 |
| >>> | |



✕

Figure 124: Preview window for the Non-conformity to be printed.

- ⇒ Select the *Print button* to print the record,
 - or,
 - ⇒ Select *Cancel button* to come back to the Non-conformity form without printing.
- If the *Print button* is selected, the application will look for the printers connected to your computer and the print menu will be opened.
- A new window will appear,
- ⇒ select in the *Name combo box* the printer to be used,
 - ⇒ define the desired properties for this job,
 - ⇒ click *Accept*,

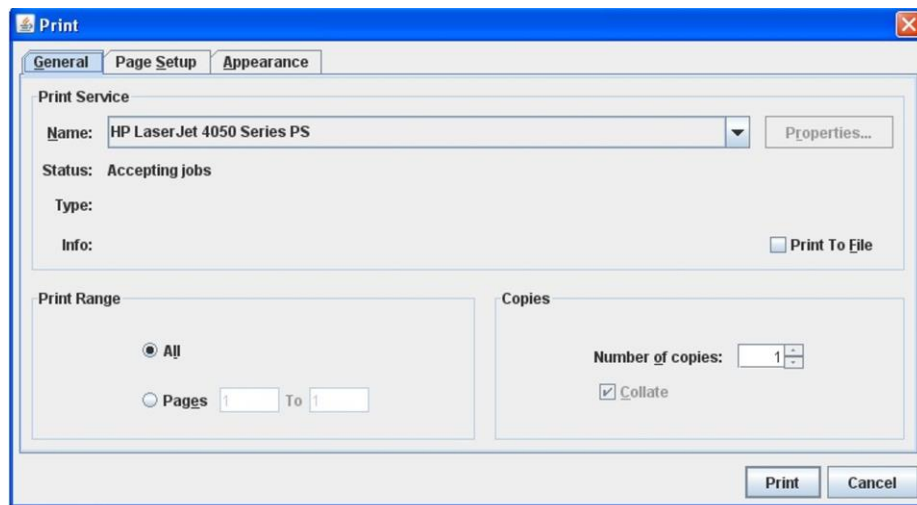


Figure 125: Print Dialog. The selected record will be printed

12.6 Deleting a Non-conformity

The Non-conformity to be deleted must be already selected, which will be done by following the steps described in section 12.3.

In the Non-conformities Form, the following steps must be done in order to delete the selected Non-conformity.

A. Delete the record.

In the Non-conformities Form, click the *Delete* button to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

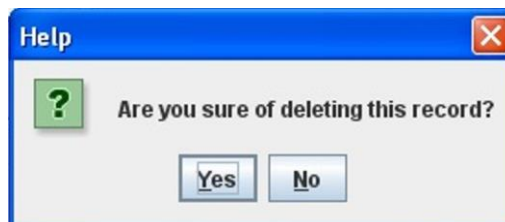


Figure 126: Warning Window to check if the user wants to delete the record

⇒ Click *YES* to delete the record.

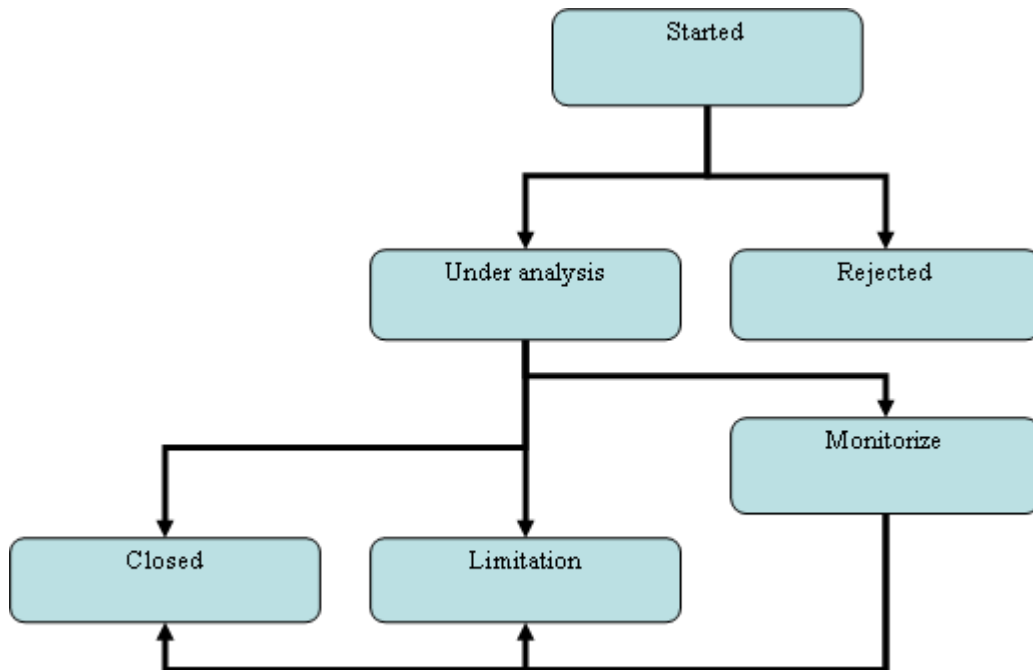
⇒ Click *NO* to exit without deleting.

13. ANOMALIES

13.1 What is an Anomaly?

An Anomaly is any abnormal behaviour of the system that must be recorded and investigated.

The Anomalies follow a life-cycle as shown in the figure:



This life-cycle can be briefly summarized in the following steps:

- In the first place, all relevant information related to the Anomaly must be introduced in the application to allow the ARB (Anomaly Review Board) evaluates the Anomaly consequences. At that point, the Anomaly status is “*Started*”.
- In the ARB meeting, the Anomaly is evaluated and the Anomaly state can be changed to “*Under analysis*” or “*Rejected*” depending of the board decision. If the Anomaly is classified as “*Under Analysis*” then a responsible (*Assigned to*) must be defined, who will be in charge to analyse it in more in detail.
- After the necessary analysis is performed, the Anomaly’s responsible can request to change the state of the Anomaly to “*Monitorize*” (i.e., the Anomaly must be maintained opened to monitorize any reoccurrences during a certain period), “*Closed*” (i.e., the Anomaly has been solved or the analysis made by the responsible indicates that it is not going to reoccur) or “*Limitation*” (i.e., the Anomaly cannot be solved and must be accepted as a Limitation of the system).
- Finally, the ARB must take into account the analysis made by the Anomaly’s responsible and has to decide if the Anomaly is ending as “*Closed*” or as a “*Limitation*”. One of the actions that could be performed during the Anomaly life is to raise a Configuration Change to request a modification of the system in order to solve the Anomaly or to raise a Non-conformity if the Anomaly is a consequence of the System requirements have not been correctly fulfilled.

GECO provides the support to manage and archive the Anomalies. In this sense, all the relevant information generated during the Anomaly life-cycle can be introduced and maintained in the application. GECO will also help in the Anomaly coordination and information distribution by sending emails at the most important Anomaly life-cycle transitions.

13.2 Creating a new Anomaly

Starting at the Main Window of the application,

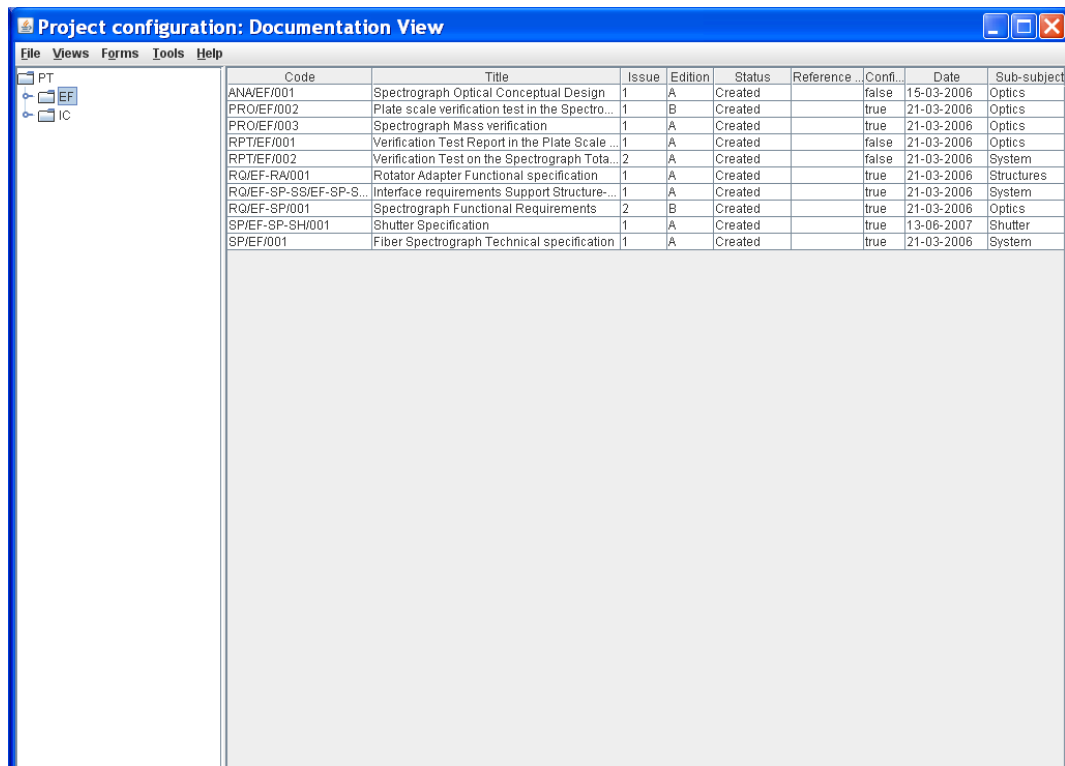


Figure 127: Main window of the application

The following steps must be executed in order to create a new Anomaly:

A. Open the Anomalies Form.

In the Main window, the Anomalies Form can be opened in two different ways:

A.I. Going through the Forms Menu.

In the Main window, select *Forms* Menu \Rightarrow *Anomalies* Form or press *ALT+O+A*.

The Anomalies Form will be opened with all available records selected.

Anomaly Form

Code: AN/EF/001 Sub-subject*: Optics Severity*: High
Initiator*: Perez , Ana Starting Date*: 26-03-2006 Criticality*: High
Assigned to: Del Castillo Rodriguez , Eva Anomaly Date*: 26-03-2006 Status*: Limitations
Due Date: 27-10-2007

Description*
images of the pinholes mask at the different positions to obtain the best focus, it was be noticed that none of the positions were good enough to focus the image on the detector.

Analysis
The detector has not been correctly mounted on the CCD Head. The solution will be to use shims to correct the detector position passively to put it far away from the last camera lens

Impact*
It is not possible to focus the instrument so that it is not possible to take correct astronomical images.

Action to close the Anomaly
The number and sizes of the shims have been calculated.

Recommended actions
To manufacture the shims and to use them to mount the detector in the corrected position.

Affected

| # | Affected |
|----|-----------------------------|
| 1 | Del Castillo Rodriguez ,Eva |
| 2 | Suarez Ibañez,Jose |
| >> | |

Taken actions

| # | Name | Action Description | Suggested Status | Action Date |
|----|--------------------|--|------------------|-------------|
| 1 | Suarez Ibañez,Jose | Problem solved as suggested in Recommended actions | Close | |
| >> | | | | |

1 from 2

Figure 128: Anomaly Form showing all the selected records

A.II. Selecting an Anomaly in the Anomalies View.

In the Main window, click the *Views* Menu \Rightarrow *Anomalies View* or press *ALT+V+A*

Project configuration: Anomalies View

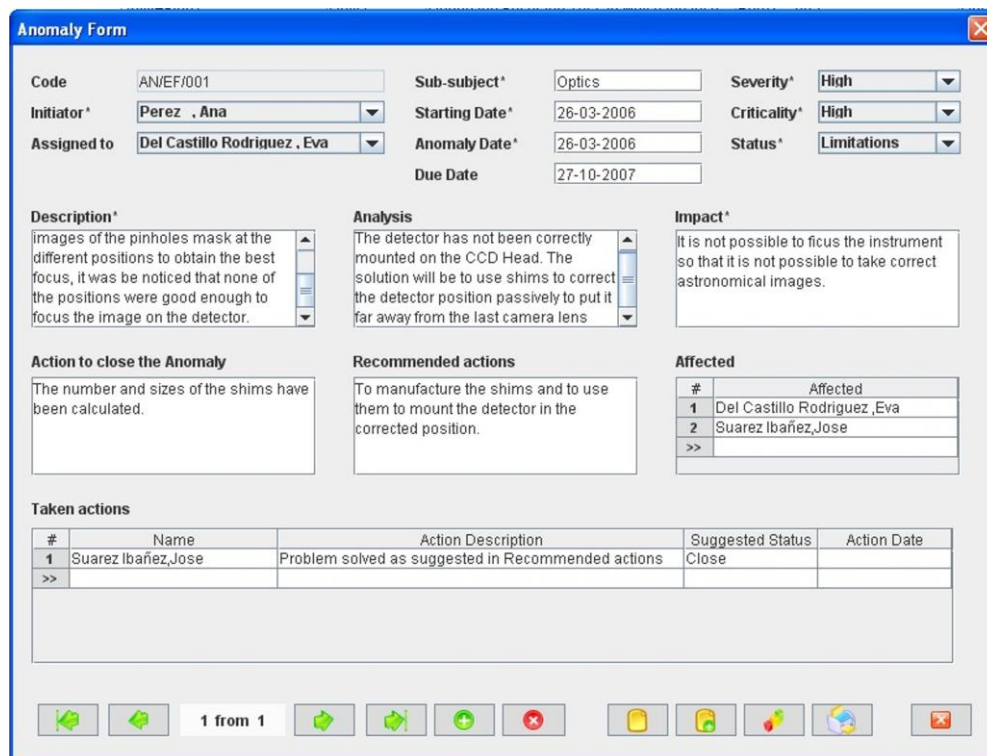
| File | Views | Forms | Tools | Help |
|------|-------|-------|-------|------|
| PT | EF | IC | | |

| Code | Sub-subject | Description | Initiator | Assign |
|-----------|-------------|--|----------------------|-------------------|
| AN/EF/001 | Optics | During the Focusing Test, in which the focu... | García Blanco, Clara | Osinde Lopez, Jos |
| AN/EF/002 | System | A test one | García Blanco, Clara | |

Figure 129: Anomalies View (right panel) showing all the selected Anomalies associated to the selected PT element (left panel)

Select an Anomaly among the Anomalies listed in the table at the right side of the window by double-clicking with the left button of the mouse.

The Anomalies Form will be opened only with the selected record available.



Anomaly Form

Code: AN/EF/001 Sub-subject*: Optics Severity*: High
 Initiator*: Perez , Ana Starting Date*: 26-03-2006 Criticality*: High
 Assigned to: Del Castillo Rodriguez , Eva Anomaly Date*: 26-03-2006 Status*: Limitations
 Due Date: 27-10-2007

Description*
 images of the pinholes mask at the different positions to obtain the best focus, it was noticed that none of the positions were good enough to focus the image on the detector.

Analysis
 The detector has not been correctly mounted on the CCD Head. The solution will be to use shims to correct the detector position passively to put it far away from the last camera lens

Impact*
 It is not possible to focus the instrument so that it is not possible to take correct astronomical images.

Action to close the Anomaly
 The number and sizes of the shims have been calculated.

Recommended actions
 To manufacture the shims and to use them to mount the detector in the corrected position.

Affected

| # | Affected |
|----|-----------------------------|
| 1 | Del Castillo Rodriguez ,Eva |
| 2 | Suarez Ibañez,Jose |
| >> | |

Taken actions

| # | Name | Action Description | Suggested Status | Action Date |
|----|--------------------|--|------------------|-------------|
| 1 | Suarez Ibañez,Jose | Problem solved as suggested in Recommended actions | Close | |
| >> | | | | |

1 from 1

Figure 130: Anomalies Form showing only the selected record

B. Add a new record.

In the Anomalies Form, new Anomalies can be created in two different ways:

B.I. Starting an empty Anomaly.

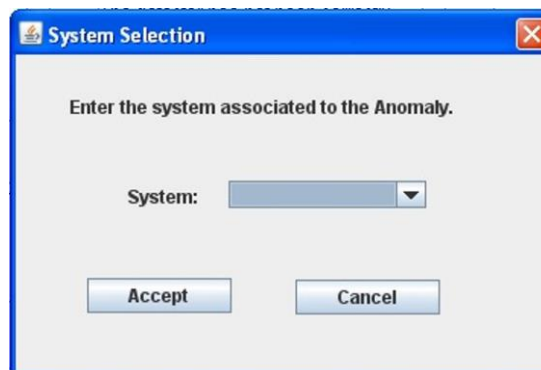
In the Anomalies Form, click the *Add* button to add a new record,



A new window will appear,

⇒ select the System PT element code in the *System* combo box (only the PT elements at system level can be selected.),

⇒ click *Accept*,



System Selection

Enter the system associated to the Anomaly.

System:

Accept Cancel

Figure 131: Anomalies Form

The new Anomaly **Code** will be automatically generated as the first one available for the Anomaly Product Tree element code selected.

All Anomalies Codes follow the same pattern as described below:

AN/PT/nnn

where,

AN: Anomaly (these characters are always the same for all Anomalies)

PT: Product Tree Element code

nnn: Sequence number that will be automatically generated by the application

The Anomaly Code is unique for each Anomaly.

The Requirement code convention is defined before starting to use GECO. More information about it can be found in section 16.

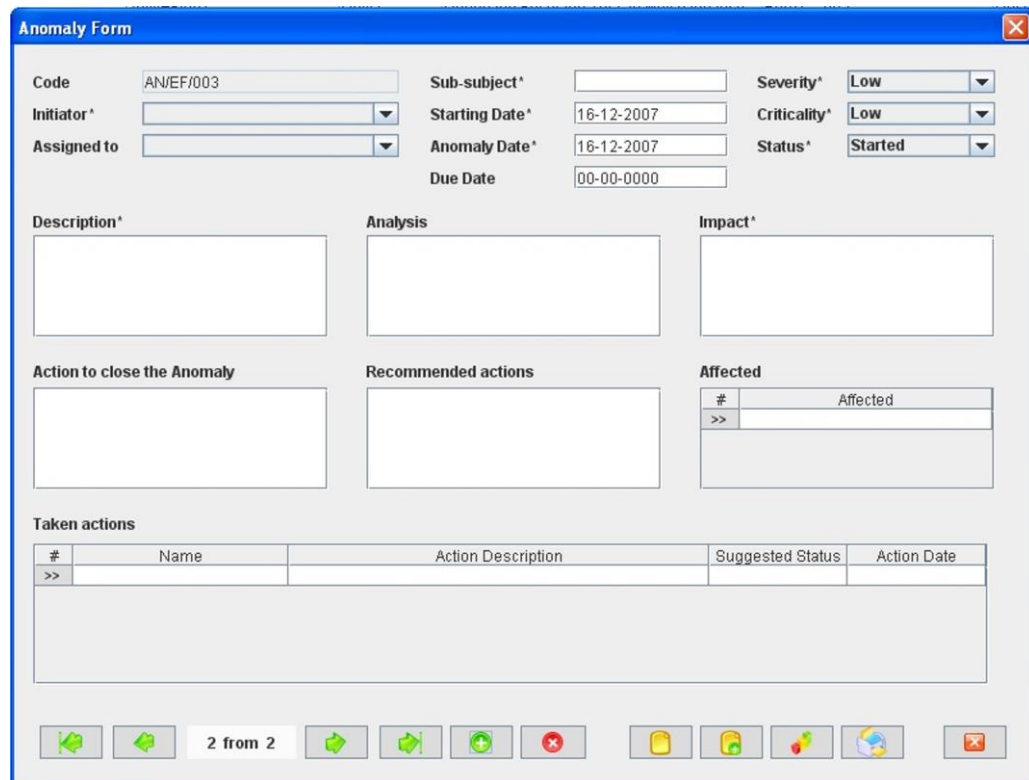


Figure 132: Anomalies Form once the PT System has been chosen as shown in Figure 131

B.II. Cloning an already existing Anomaly.

In the Anomalies Form, click the *Copy* button to clone the Anomaly that is currently selected in the form,



The new Anomaly **Code** will be automatically generated as the first one available for the same Anomaly Product Tree element code of the Anomaly that has been cloned.

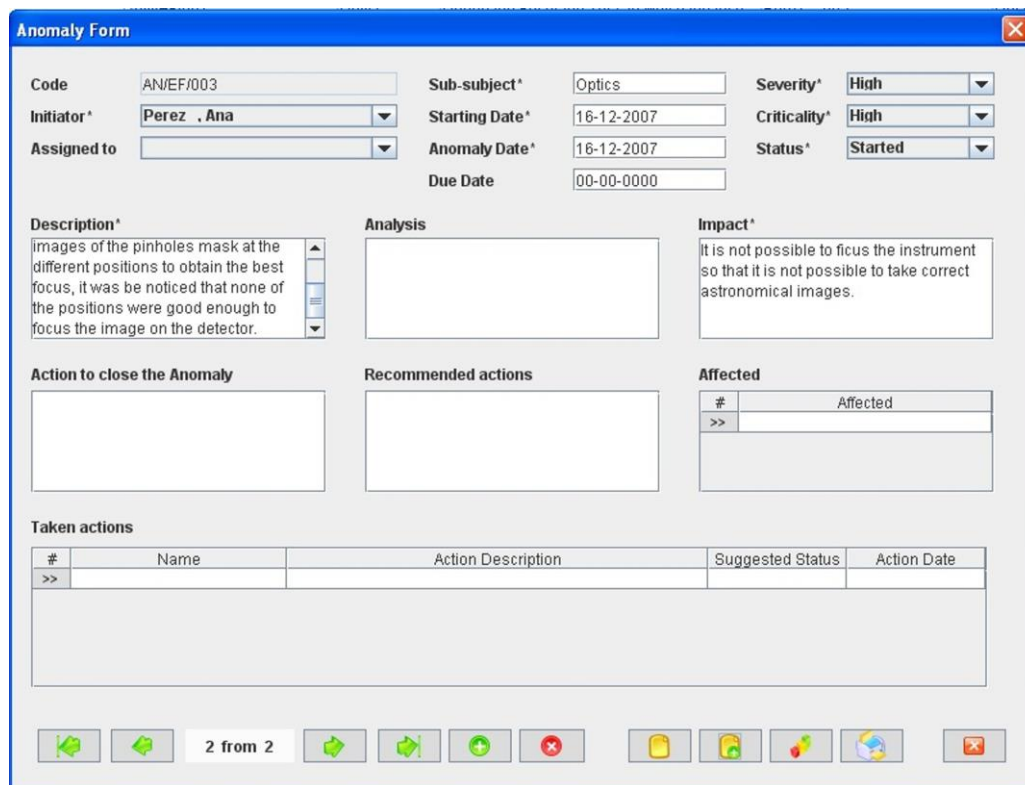


Figure 133: Anomalies Form ready to introduce a new Anomaly by cloning an existing record

C. Fill in the new record.

In the Anomalies Form, the mandatory fields that must be filled in are the following ones:

- **Code.** The Anomaly code is automatically generated by the application and can not be modified.
- **Sub-subject.** Indicate which subsystem (or group inside the organization) is affected by the Anomaly. This is a text field and the maximum length of this field is 20 characters.
- **Initiator.** Identify the person that is creating the Anomaly. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Starting date.** Indicate the date when the Anomaly is being created. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Anomaly date.** Indicate the date when the Anomaly has occurred. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.
- **Severity combo box.** Select the Anomaly severity (i.e., the effect level that the occurrence of the anomaly has had in the system) that among the options offered in the Severity combo box, which includes the following ones:
 - *High*
 - *Medium*



- *Low*

By default, the classification is “*Low*”.

- **Criticality combo box.** Select the Anomaly criticality (i.e., the impact that the anomaly or the reoccurrence of the anomaly can have in the system) that among the options offered in the Criticality combo box, which includes the following ones:
 - *High*
 - *Medium*
 - *Low*

By default, the classification is “*Low*”.

- **Status combo box.** Select the Anomaly status among the options offered in the Status combo box, which includes the following ones:
 - *Started*
 - *Under analysis*
 - *Rejected*
 - *Closed*
 - *Limitation*

When the Anomaly is created, the default status is “*Started*”.

- **Description.** Describe the Anomaly in detail, what happened, which actions were performed, etc. This is a text field and the maximum length of this field is 300 characters.
- **Impact.** Describe the impact that the Anomaly has had in the system functionality. This is a text field and the maximum length of this field is 250 characters.

The rest of the fields that could be filled are the following ones:

- **Analysis.** If any analysis about the Anomaly has already been done, introduce a description of it in this box. This is a text field and the maximum length of this field is 300 characters.
- **Recommended actions.** Describe which actions are recommended to investigate the anomaly. This is a text field and the maximum length of this field is 300 characters.
- **Affected.** Identify the persons that can be affected by the Anomaly (as many persons as wanted can be selected). The affected persons will receive by email the notification related to the Anomaly modifications. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.

The fields *Assigned to*, *Estimated date*, *Action to close the Anomaly* and all the fields under *Taken actions* should not be filled at the creation of the Anomaly. The first two fields must be filled at the ARB where the Anomaly is reviewed. The *Taken Actions* fields must be filled by the users (if the “*Assigned to*” field changes) who are doing actions to investigate

the Anomaly. Eventually, the Action to close the Anomaly must be filled at the ARB where the Anomaly is ended (i.e., *Status* changed to “Closed” or “Limitation”).

D. Save the new record.

In the Anomalies Form, click the *Save* button to save the record,



If the current record is not saved, the new record will not be created.

Once the Anomaly is saved, the application will send an email to notify that the Anomaly has been created.

“*The current status of the Anomaly (Code) is (new status)*” to be sent to the Initiator, the person assigned to do it (if exists) and the affected persons (if exists).

E. Close the Anomalies Form

In the Anomalies Form, click the *Exit* button to exit the form,



If the record has been saved, the Anomalies Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 134: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Anomalies Form.

13.3 Selecting a particular Anomaly

In the Main window, the form view of a particular Anomaly can be opened in two different ways:

A. Going through the Forms Menu.

In the Main window, select *Forms* Menu ⇒ *Anomalies* Form or press *ALT+O+A*.

In order to find a particular Anomaly, the following actions can be done:

⇒ Use the arrows for moving among the Anomalies currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

⇒ Use the *Filter* button to filter/un-filter the set of Anomalies currently selected in the form,



A new window will appear:

⇒ Click *Data filter activated* box to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),


⇒ select in the *Field* combo box the desired field to filter the data,

⇒ select in the *Op* combo box how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

⇒ write in the *Value* text field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

⇒ define as many filters as wanted (by adding new lines),

⇒ click *Accept*,



The dialog box titled "Anomalies Filter" contains a checked checkbox labeled "Data filter activated". Below it is a table with four columns: "#", "Field", "Op", and "Value". The first row has a ">>" button in the "#" column and empty fields in the others. Below the table is a large empty text area. At the bottom are "Accept" and "Reset" buttons.

| # | Field | Op | Value |
|----|-------|----|-------|
| >> | | | |

Figure 135: Anomalies Filter to select the desired documents by different fields

B. Selecting the Anomaly in the Anomalies View.

In the Main window, click the *Views Menu* ⇒ *Anomaly View* or press *ALT+V+A*.

In order to constrain (by Product Tree Element or by filtering) the number of Anomalies listed in the view, see the steps to be followed in section 4.2.

Select the desired Anomaly among the Anomalies listed in the table at the right side of the window by double-clicking with the left button of the mouse.



13.4 Modifying existing Anomalies

The Anomaly to be modified must be already selected, which will be done by following the steps described in section 13.3.

In the Anomalies Form, the following steps must be done in order to modify the selected Anomaly.

A. Modify the desired fields.

Make the desired changes in the Anomaly fields, taking into account the constraints identified in section 13.2, numbered item C) and, also, that the *Code*, *Initiator*, *Starting date* and *Anomaly date* fields cannot be modified once the Anomaly has been already created.

All the rest of the fields can be modified and, in particular, the following fields must be filled after the ARB meeting where the Anomaly is presented:

- **Assigned to.** Identify the person that is going to investigate the Anomaly. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Due date.** Indicate the date when the Anomaly should be solved. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.

Later, each responsible (i.e., person assigned to an Anomaly) must introduce the actions performed by him/her into the fields under *Taken actions*. The following fields must be filled:

- **Name.** Identify the person that is describing the taken action. In the combo box, all persons in the organization that have been previously introduced as Users in the application (see section 14) can be selected.
- **Action Description.** Describe the taken action in detail: the action done, the observed result, etc. This is a text field and the maximum length of this field is 200 characters.
- **Suggested status combo box.** Suggest a new status for the Anomaly among the options offered in the Suggested status combo box, which includes the following ones:
 - *Monitorize*
 - *Close*
 - *Limitation*

There is no default for the combo box.

- **Action date.** Indicate the date when the action has been done. This is a date field with the following format: **dd-mm-yyyy**, where dd: day, mm: month and yyyy: year.

At the ARB when the Anomaly is finalized, the following field must be filled:

- **Action to close the anomaly.** Describe which action justifies changing the status of the anomaly as Closed. This is a text field and the maximum length of this field is 300 characters.

B. Save the modified record.

In the Anomaly Form, click the *Save* button to save the record,



If the record is not saved, the changes will not be applied.

Once the Anomaly is saved, the application will send an email to notify that a modification has been done to the Anomaly. This notification could be the following ones depending of the modification done

“The current status of the Anomaly (Code) is (new status)” to be sent to the Initiator, the person assigned to do it and the affected persons whenever the status is changed.

“The Assigned person to the Anomaly (Code) has been changed” to be sent to the Initiator, to the previous responsible and to the new one.

“The due date of the Anomaly (Code) has been changed” to be sent to the responsible.

C. Close the Anomalies Form

In the Anomalies Form, click the *Exit* button to exit the form,



If the record has been saved, the Anomalies Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 136: Warning Window reporting that changes have not been saved

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Anomalies Form.

13.5 Printing an Anomaly

The Anomaly to be printed must be already selected, which will be done by following the steps described in section 13.3.

In the Non-conformity Form, the following step must be done in order to print the selected Non-conformity.

C. Print the record.

In the Non-conformity Form, click the *Print button* to print the record,



A preview of the record to be printed will appear.

Page preview [X]

Anomaly report

Code: ANEF001 Initiator: Perez , Ana
 Sub-subject: Optics Assigned to: Del Castillo Rodriguez , Eva
 Starting date: 26-03-2006 Anomaly date: 26-03-2006
 Due date: 27-10-2007
 Severity: High Status: Limitations
 Criticality: High

Description
 During the Focusing Test, in which the focusing mechanism was used to move the collimator and to take images of the pinhole mask at the different positions to obtain the best focus, it was noticed that none of the positions were good enough to focus the image on the detector.

Analysis
 The detector has not been correctly mounted on the CCD Head. The solution will be to use shims to correct the detector position passively to put it far away from the last camera lens.

Impact
 It is not possible to focus the instrument so that it is not possible to take correct astronomical images.

Action to close the Anomaly
 The number and sizes of the shims have been calculated.

Recommended actions
 To manufacture the shims and to use them to mount the detector in the corrected position.

Affected Users

| # | Affected |
|----|-----------------------------|
| 1 | Del Castillo Rodriguez ,Eva |
| 2 | Suarez Ibañez Jose |
| >> | |

Taken actions

| # | Name | Action Description | Suggested Status | Action Date |
|----|--------------------|--|------------------|-------------|
| 1 | Suarez Ibañez Jose | Problem solved as suggested in Recommended actions | Close | |
| >> | | | | |

[Print Icon] [Close Icon]

Figure 137: Preview window for the Anomaly to be printed.

⇒ Select the *Print button* to print the record,

or,

⇒ Select *Cancel button* to come back to the Anomaly form without printing.

If the *Print button* is selected, the application will look for the printers connected to your computer and the print menu will be opened.

A new window will appear,

⇒ select in the *Name combo box* the printer to be used,

- ⇒ define the desired properties for this job,
- ⇒ click *Accept*,

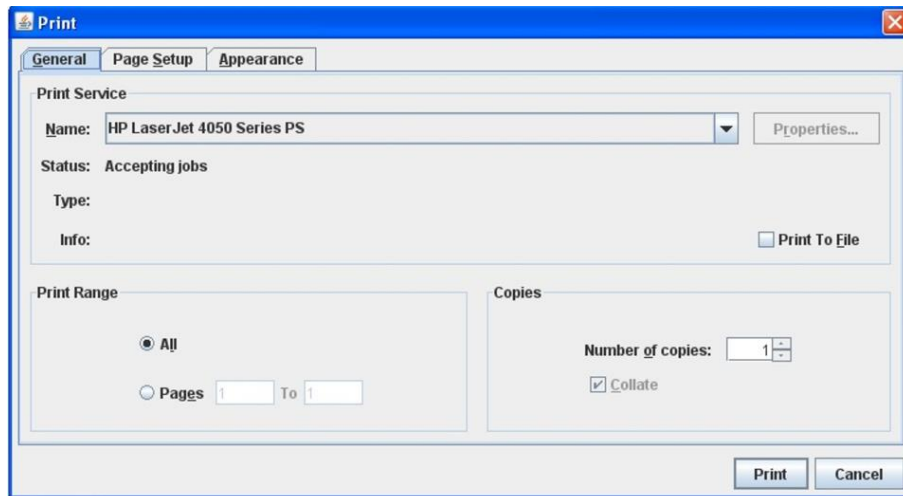


Figure 138: Print Dialog. The selected record will be printed

13.6 Deleting an Anomaly

The Anomaly to be deleted must be already selected, which will be done by following the steps described in section 13.3.

In the Anomalies Form, the following steps must be done in order to delete the selected Anomaly.

A. Delete the record.

In the Anomalies Form, click the *Delete* button to delete the record,



A new window will appear to ask the user if he/she really wants to delete the record.

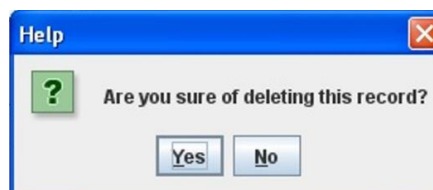


Figure 139: Warning Window to check if the user wants to delete the record

- ⇒ Click *YES* to delete the record.
- ⇒ Click *NO* to exit without deleting.

14. USERS

14.1 What means to be an User in GECO

A User is commonly defined as a person, organization, or other entity that employs the services provided by a system.

In GECO, the same definition applies to the term User, so any person that is susceptible to use the application must be record as a User inside GECO.

All recorded Users will be able to start and use GECO and, also, to be selectable in the different people combo box existing in the application such as the Document authors, the Anomaly Initiators and so on.

14.2 Creating a User

Starting at the Main Window of the application,

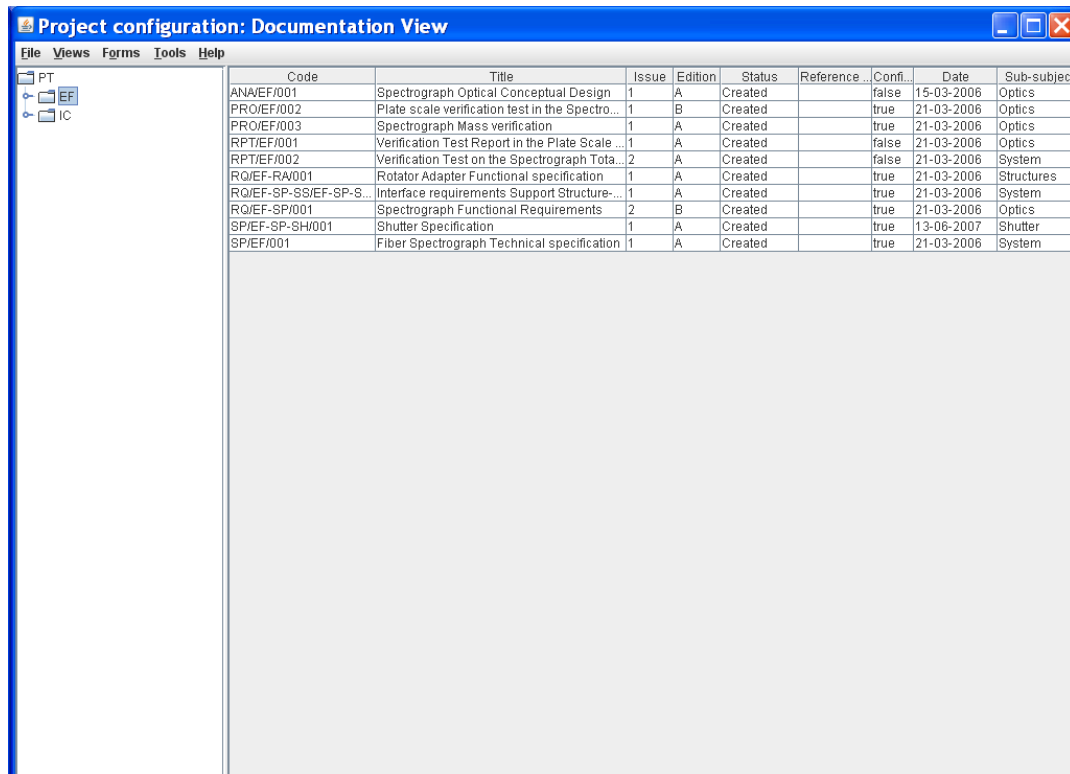


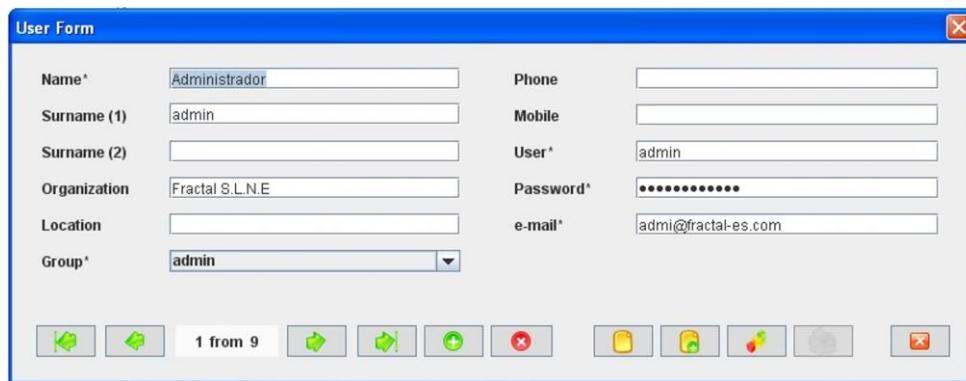
Figure 140: Main window of the application

the following steps must be executed in order to create a new User:

A. Open the Users Form.

In the Main window, select *Forms Menu* \Rightarrow *Users Form* or press *ALT+O+U*.

The Users Form will be opened with all available records selected.



The screenshot shows a 'User Form' window with the following fields and values:

| Field | Value |
|--------------|---------------------|
| Name* | Administrador |
| Surname (1) | admin |
| Surname (2) | |
| Organization | Fractal S.L.N.E |
| Location | |
| Group* | admin |
| Phone | |
| Mobile | |
| User* | admin |
| Password* | |
| e-mail* | admi@fractal-es.com |

At the bottom, there are navigation buttons and a status bar showing '1 from 9'.

Figure 141: Users Form showing all the selected records

B. Add a new record.

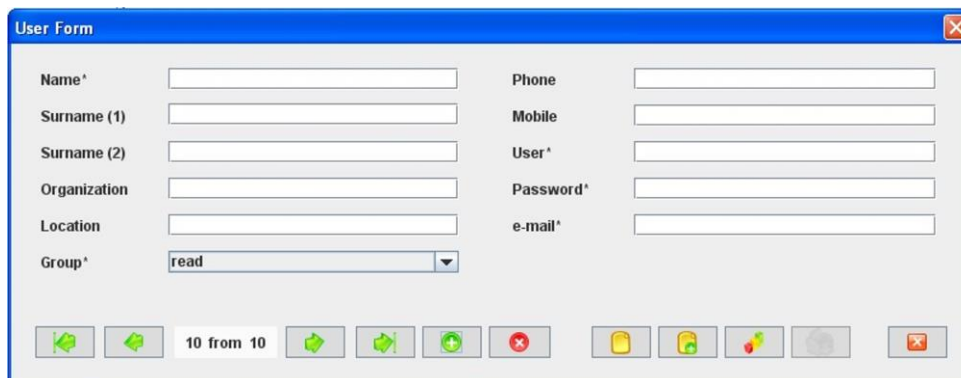
In the Users Form, new Users can be created in two different ways:

B.I. Starting an empty User.

In the Users Form, click the *Add* button to add a new record,



A new Users Form will be opened empty and ready to be filled.



The screenshot shows a new 'User Form' window with the following fields and values:

| Field | Value |
|--------------|-------|
| Name* | |
| Surname (1) | |
| Surname (2) | |
| Organization | |
| Location | |
| Group* | read |
| Phone | |
| Mobile | |
| User* | |
| Password* | |
| e-mail* | |

At the bottom, there are navigation buttons and a status bar showing '10 from 10'.

Figure 142: User Form to introduce a new User.

B.II. Cloning an already existing User.

In the Users Form, click the *Copy* button to clone the User that is currently selected in the form,



A new Users form will be opened with several fields cloned from the previous record and ready to be completed.

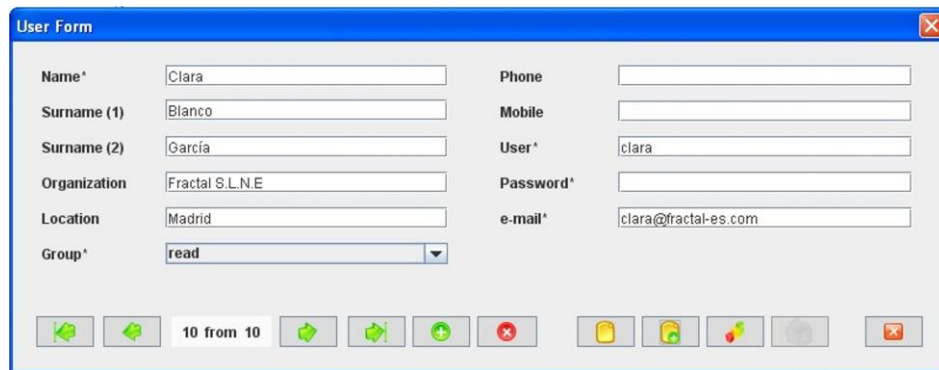


Figure 143: Users Form ready to introduce a new User by cloning an existing record

C. Fill in the new record.

In the Users Form, the mandatory fields that must be filled in are the following ones:

- **Name.** Indicate the first name of the User. This is a text field and the maximum length of this field is 45 characters.
- **E-mail.** Indicate the User e-mail address. This is a text field and the maximum length of this field is 45 characters.
- **User.** Indicate the user that is going to be used by this particular User to enter into GECO. This is a text field and the maximum length of this field is 15 characters.
- **Password.** Indicate the password that is going to correspond with the user entered in the previous paragraph in order to enter into GECO. This is a text field and the maximum length of this field is 32 characters.
- **Group.** Indicate to which group belongs this user. There are two options:
 - **read:** The user can only visualize the data.
 - **admin:** The user can add new records and modify and delete the existing ones.

By default, the group is “read”.

The rest of the fields that could be filled are the following ones:

- **Surname (1).** Indicate the first last name of the User. This is a text field and the maximum length of this field is 45 characters.
- **Surname (2).** Indicate the second last name of the User. This is a text field and the maximum length of this field is 45 characters.
- **Phone.** Indicate the User phone number. This is a text field and the maximum length of this field is 45 characters.
- **Mobile.** Indicate the User mobile phone number. This is a text field and the maximum length of this field is 45 characters.
- **Organization.** Indicate the organization which the User belong to. This is a text field and the maximum length of this field is 45 characters.

- **Location.** Indicate the User location inside the organization. This is a text field and the maximum length of this field is 45 characters.

D. Save the new record.

In the Users Form, click the *Save* button to save the record,



If the current record is not saved, the new record will not be created.

Once the User is saved, the application will send an email to notify the creation of the User to the User's email with the following text:

"You have been registered in GECO. Your password is (password)"

E. Close the Users Form

In the Users Form, click the *Exit* button to exit the form,



If the record has been saved, the Users Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.

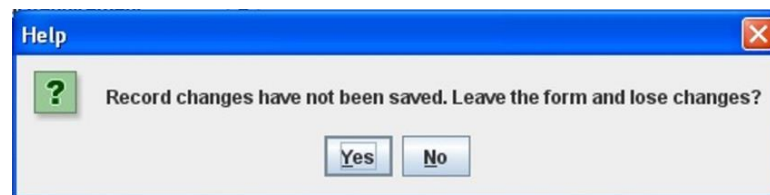


Figure 144: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Users Form.

14.3 Selecting an User

In the Main window, the form view of a particular User can be opened as follows:

C. Going through the Forms Menu.

In the Main window, select *Forms* Menu ⇒ *Users* Form or press *ALT+O+U*.

In order to find a particular User, the following actions can be done:

⇒ Use the arrows for moving among the Users currently selected in the form,



To go to the first record of the selected ones,



To go to the previous record to the current one,



To go to the next record to the current one and



To go to the last record of the selected ones

⇒ Use the *Filter* button to filter/un-filter the set of Users currently selected in the form,



A new window will appear:

⇒ Click *Data filter activated* box to filter the data (if this box is not selected the filter will not be applied and the current filter already applied to the data in the form will be recorded),


⇒ select in the *Field* combo box the desired field to filter the data,

⇒ select in the *Op* combo box how the previously selected field must match the defined *Value* (i.e., “starting with”, “contains”, “is”, “ending by”)

⇒ write in the *Value* text field the text that is going to be used to filter the selected Field according to the selected option in the previous steps,

⇒ define as many filters as wanted (by adding new lines),

⇒ click *Accept*,



| # | Field | Op | Value |
|----|-------|----|-------|
| >> | | | |

Figure 145: Users Filter to select the desired documents by different fields

14.4 Modifying existing Users

The User to be modified must be already selected, which will be done by following the steps described in section 14.3.

In the Users Form, the following steps must be done in order to modify the selected User.

A. Modify the desired fields.

Make the desired changes in the User fields, taking into account the constraints identified in section 14.2, numbered item C).

All fields in the Users form can be modified.

B. Save the modified record.

In the Users Form, click the *Save* button to save the record,



If the record is not saved, the changes will not be applied.

Once the User is saved, the application will send an email to notify the modification done to the User's email. Two different emails can be sent:

"Your password has been modified" when only the password has been changed

"The User's properties have been modified" when any other field has been changed

C. Close the Users Form

In the Users Form, click the *Exit* button to exit the form,



If the record has been saved, the Users Form will be closed.

If the record has not been saved, the following window will appear to ask the user if he/she wants to exit without saving.



Figure 146: Warning Window reporting that changes have not been saved.

⇒ Click *YES* to exit without saving.

⇒ Click *NO* to come back to the Users Form.

14.5 Unsubscribing/Deleting an User

The User to be unsubscribed/deleted must be already selected, which will be done by following the steps described in section 14.3.

In the Users Form, the following steps must be done in order to unsubscribe/delete the selected User.

A. Unsubscribe the user.

In the User Form, click the *Delete* button to unsubscribe the user record,



A new window will appear.

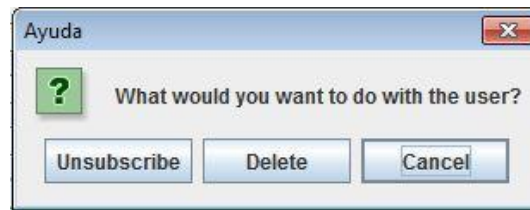


Figure 147: Warning Window to ask unsubscribe or delete a user.

⇒ Click *Unsubscribe* to unsubscribe the user.

⇒ Click *Cancel* to exit without unsubscribing/deleting.

Once the User has been unsubscribed, the application will send an email to notify it to the User's email with the following text: "*You have been unregistered in GECO*"

It is important to mention that, in order to maintain the history, an unsubscribed Users will not be deleted from the Person's list where they have been already selected. It means that if, for example, the unsubscribed user was the author of a document, he/she is going to be maintained as the document's author.

B. Delete the record.

In the User Form, click the *Delete* button to delete the record,



A new window will appear to ask the user what wants to do with the record.

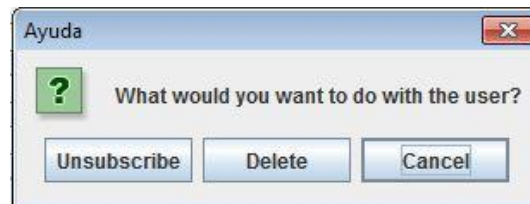


Figure 148: Warning Window to ask what wants to do with the user record

⇒ Click *Delete* to delete the record.

⇒ Click *Cancel* to exit without unsubscribing/deleting.

It is important to mention that the deleted Users are deleted from all Person's lists. It means that if, for example, the deleted user was the author of a document, he/she is going to disappear as the document's author.



15. ERROR MESSAGES

In this section, the error messages that could appear while the user is working with GECO are described.

1. *"You are at the first record"*

This error could appear in any form whenever the User is already in the first record of the set of records selected and he/she is trying to move to the further down.

2. *"You are at the last record"*

This error could appear in any form whenever the User is already in the last record of the set of records selected and he/she is trying to move to the further up.

3. *"Record has not been saved. Please, fill all the mandatory fields"*

This error could appear in any form whenever the User is trying to save it without filling all mandatory fields, which are identified with an "*".

4. *"You have to select a requirement document first by using the Document View"*

This error could appear in any view whenever the User is selecting the option *Export requirements to XML* in the *Tool Menu* without pre-selecting a requirement document first.

16. SETTING-UP GECO

GECO gives some flexibility to establish the way that the data codes are defined. The Users must decide how they want the codification convention and these decisions will be inserted in GECO database and used as constraints during the life of each particular application.

In this section, we describe the rules and restrictions to define the code conventions. It is important to mention that once they are established, they must not be changed afterwards, to avoid any incoherencies in the data.

- **PT elements:** The PT elements follow the pattern described below:

AA-AA-AA-AA

where

AA: Product Tree Element acronym to be defined as any combination of alphanumeric characters (excluding the “%”). The length of this acronym is not fixed.

-: PT Element separator

The user must define:

- The user must define which character is used as separator in the PT Element code to distinguish among the different PT elements levels. In this example and along this manual, we have selected the “-”. The only character not allowed is “%”.

Note: The separator character that has been chosen for the PT elements must be different to the ones selected for the other elements (requirements, documents, configuration changes, non-conformities and anomalies). Otherwise, the separator character for requirements, documents, configuration changes, non-conformities and anomalies could be the same (i.e., this restriction only applies to the PT elements).

- **Requirements:** The Requirements follow the pattern described below:

TT/PT/nnn

where

/: Requirements separator

TT: Requirements type

PT: Product Tree Element or Interface code

nnn: Sequence number that will be automatically generated by the application

The user must define:

- The character to be used as separator inside the Requirements code. In this example and along this manual, we have selected the “/”. The only character not allowed is the “%”.
- The Requirements types which could be any combination of alphanumeric characters (excluding “%”). In this manual, we have used “FR” (Functional Requirements) and “TR” (Technical Requirements).



- The order of the different parts of the Code. It means that all these combinations are possible: TT/PT/nnn, TT/nnn/PT, PT/nnn/TT, nnn/TT/PT, nnn/PT/TT and PT/TT/nnn.
- **Documents:** The Documents follow the pattern described below:

TT/PT/nnn

where,

/: Documents separator

TT: Document type

PT: Product Tree Element or Interface code

nnn: Sequence number that will be automatically generated by the application

The user must define:

- The character to be used as separator inside the Document code. In this example and along this manual, we have selected the “/”. The only character no allowed is “%”.
- The Documents types which could be any combination of alphanumeric characters (excluding “%”). At least you must define the document types of Procedure, Report, Requirements and Specification documents. In this manual, we have used the following ones: ANA (Analysis), DR (Drawing), INT (Interface), MOM (Minutes of Meeting), PRO (Procedure), RPT (Report), RQ (Requirements Document), SP (Specification Document) and TEN (Technical Note).

In particular, it must be clarified for setting-up the tool the acronyms shall be used for requirements and specification documents, interface documents, procedures and test reports, because these document types are used in some forms to filter the document list and, therefore, facilitate, document search.

- The order of the different parts of the Code. It means that all these combinations are possible: TT/PT/nnn, TT/nnn/PT, PT/nnn/TT, nnn/TT/PT, nnn/PT/TT and PT/TT/nnn.

- **Configuration Changes:** The Configuration Changes follow the pattern described below:

CC/PT/nnn

where,

/: Configuration Change separator

CC: Configuration Change identifier

PT: Product Tree Element code

nnn: Sequence number that will be automatically generated by the application

The user must define:



- The character to be used as separator inside the Configuration change code. In this example and along this manual, we have selected the “/”. The only character no allowed is the “%”.
 - The Configuration change identifier which could be any combination of alphanumeric characters (excluding “%”). In this manual, we have used the acronym CC (Configuration Change).
 - The order of the different parts of the Code. It means that all these combinations are possible: CC/PT/nnn, CC/nnn/PT, PT/nnn/CC, nnn/CC/PT, nnn/PT/CC and PT/CC/nnn.
- **Non-conformities:** The No-conformities follow the pattern described below:

NC/PT/nnn

where,

/: Non-conformities separator

NC: Non-conformity identifier

PT: Product Tree Element code

nnn: Sequence number that will be automatically generated by the application

The user must define:

- The character to be used as separator inside the Non-conformity code. In this example and along this manual, we have selected the “/”. The only character no allowed is “%”.
 - The Non-conformity identifier which could be any combination of alphanumeric characters (excluding “%”). In this manual, we have used the acronym NC (No-conformity).
 - The order of the different parts of the Code. It means that all these combinations are possible: NC/PT/nnn, NC/nnn/PT, PT/nnn/NC, nnn/NC/PT, nnn/PT/NC and PT/NC/nnn.
- **Anomalies:** The Anomalies follow the pattern described below:

AN/PT/nnn

where,

/: Anomalies separator

AN: Anomaly identifier

PT: Product Tree Element code

nnn: Sequence number that will be automatically generated by the application

The user must define:

- The character to be used as separator inside the Anomaly code. In this example and along this manual, we have selected the “/”. The only character no allowed is “%”.



-
- The Anomaly identifier which could be any combination of alphanumeric characters (excluding "%"). In this manual, we have used the acronym AN (Anomaly).
 - The order of the different parts of the Code. It means that all these combinations are possible: AN/PT/nnn, AN/nnn/PT, PT/nnn/AN, nnn/AN/PT, nnn/PT/AN and PT/AN/nnn.